North Shore
Transit Improvements

North Shore Transit Improvements Project
Major Investment Study

Draft Copy

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Massachusetts Bay Transportation Authority

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Executive Summary

Executive Summary

1.0 Background

Consensus for the best mix of transit investments has been difficult to achieve on the North Shore despite the Massachusetts Bay Transportation Authority's (MBTA) previous efforts to develop solutions for the Corridor's transportation problems. Over the last decade, MBTA studies have attempted to evaluate the North Shore on a regional basis, but have evolved into processes that support individual projects. The purpose of the North Shore Transit Improvements Project-Major Investment Study (MIS) is to identify the priorities for transit system investments in the study area and to achieve consensus around a strategy for making transportation improvements that address regional mobility needs.

The MIS study area includes 32 communities from Boston to the New Hampshire border. The MIS offered the opportunity for a current evaluation of multi-modal alternatives and for a more inclusive process that has allowed stakeholders to participate in an open and collaborative process.

This MIS does recognize the significant work that was undertaken in previous evaluation efforts, and has built upon those foundations with an emphasis on consensus-building in the public process. The extensive public process for this Project identified that two kinds of needs exist on the North Shore for transit improvements. Areas from Salem north are better served by improved access to Boston through upgrades to the existing commuter rail system. Lack of highway access for areas from Salem south suggests an investment in a high-density type of transit service. Because of these differing needs and associated solutions, two parallel evaluation processes were established. A Draft Environmental Impact Statement (DEIS) is being prepared for the southern Revere to Salem Corridor. Meanwhile, the MIS addresses issues of a regional nature that encompass the entire 32 community study area and all modes of transit, while focusing particularly on improvements north of Salem.

2.0 Development of the MIS

For the MIS, the MBTA established a 15 member project Steering Committee, which was made up of elected officials or their representatives, as well as other major constituency groups from the areas of business, education, environment, labor, social services, and transportation. The purpose of this group has been to represent various interests on the North Shore and to assist the MBTA in the MIS decision-making process. The Steering Committee has worked with the MBTA throughout the MIS process and has been a partner in the development of goals and objectives, the identification and refinement of project alternatives, and the evaluation of projects.

In addition to the Project's Steering Committee, a variety of strategies have been implemented to keep the public both informed and involved during the study process including public meetings; briefings with key stakeholders; and a survey of MBTA riders. The public meetings have been held at strategic points during the course of the MIS to keep the general public advised of the progress of the study and to gain additional input. Some of these meetings have been held at the specific request of neighborhood organizations. At most meetings, Project Team members are available for questions at an Open House, before the meeting begins. MBTA officials and the Project Team have also met with state legislators, local community organizations, conservation commissions, and local planning departments during the course of the MIS development. This outreach provided the MBTA and the Steering Committee with the input needed to make decisions about the North Shore's transportation needs and possible transit solutions.

2.1 Goals of the MIS

A number of the early Steering Committee meetings for the MIS focused on developing goals for the MIS analysis. These goals, finalized at a meeting in May 2001, are noted below:

Improve Community Access
- ☐ Access to Logan Airport
- ☐ Access to Employment Centers
- ☐ Intercommunity Access
- ☐ Improved Access to Boston
- ☐ Provide Service for North Shore Commuter Students
- ☐ Access during Off-peak (inbound & outbound)
- ☐ Services for Transit Dependent Populations

Upgrade Existing North Shore Service
- ☐ Improve Transit Feeder Service
- ☐ Add more Transit Stops
- ☐ Increased Commuter Rail Frequency
- ☐ Better Intermodal Connections/Stations
- ☐ Additional Parking Capacity
- ☐ Additional Transit Capacity
- ☐ Provide More User-Friendly Service

Promote North Shore Economic Growth
- ☐ Encourage New Employers to North Shore
- ☐ Keep North Shore Town Centers and Businesses Accessible
- ☐ Promote Tourist Connections to the North Shore

Minimize Adverse Environmental Impacts
- ☐ Air Quality Standards
- ☐ Reduce Roadway Congestion

Encourage Community Oriented Design
- ☐ Multi-use Design
- ☐ Promote Bicycle and Walk Alternatives
- ☐ Focus on Station Design to Promote Livability in Urban Centers

2.2 Universe of Projects

As previously noted, the identification and development of alternatives involved extensive outreach to the public. The first step included a review of previous studies conducted throughout the study area. This set of projects was supplemented by ideas presented at Steering Committee and public outreach meetings early in the process. Finally, the list of potential projects were presented to the Steering Committee and public for concurrence. The result of this collaboration was the following Universe of Projects for the MIS (see Figure ES-1):

- ☐ Gloucester Station Improvements;
- ☐ Beverly Depot Station Improvements;
- ☐ Salem Station Improvements;
- ☐ North Shore Bus System Improvements;
- ☐ Newburyport Branch and Rockport Branch Increased Frequencies;
- ☐ Winthrop to Boston Ferry Service;

- Rockport Station Improvements;
- Lynn to Boston Ferry Service;
- Revere Commuter Rail Station;
- South Salem Commuter Rail Station;
- Salem-Danvers via Peabody Commuter Rail Service;
- Newburyport/Rockport Line Coaches;
- Newburyport Branch and Rockport Branch Station Improvement Program;
- Newburyport Branch and Rockport Branch Highway Grade Crossing Improvements/Elimination Program;
- Beverly to Boston DMU/Shuttle Service;
- Newburyport Branch and Rockport Branch Signal System Upgrades;
- Second Salem Tunnel; and,
- Salem to Boston Ferry Service.

2.3 Project Evaluation

Each individual project in the North Shore Transit Improvements Project MIS was first evaluated regarding how it met the study's established goals and objectives. Following this review, each project was then analyzed with regard to its projected benefits and potential technical, social and environmental impacts. Assessments were conducted to identify what the overall impacts were of the project. This information was then used to identify the challenges that would need to be overcome to implement a project.

The final element of the MIS analysis involved a review of these projects within the system-wide constraints of the MBTA. This system review is an essential part of the analysis because it identifies system constraints, conflicts, or other unknowns that need to be considered when advancing the project. Each project needs to be measured against not only the needs, resources and planned improvements of the North Shore, but also of the remainder of the MBTA's service area. This final review allowed the proposed projects to be prioritized in accordance with the limited resources of the entire MBTA system.

These three reviews were then compiled to prioritize MIS projects into Short-Term, Medium-Term and Long-Term categorizations. The expected time frame that corresponds to those priority ratings are as follows:

- Short-Term: 0 to 10 years
- Medium-Term: 11 to 20 years
- Long-Term: Greater than 20 years

The time frame for implementation or priority for any one individual project could change as a result of a change in conditions, community desires, or financial support from sources outside of the MBTA.

2.4 Recommendations

The following table (ES-1) provides a summary of the North Shore Transit Improvements Project MIS priority recommendations.

Table ES-1 MIS Universe of Projects

Project	Short-Term	Medium-Term	Long-Term
Gloucester Station Improvements	✓		
Beverly Depot Station Improvements	✓		
Salem Station Improvements	✓		
North Shore Bus System Improvements	✓	✓	
Newburyport Branch and Rockport Branch Increased Frequencies	✓	✓	✓
Rockport Station Improvements		✓	
Lynn to Boston Ferry Service		✓	
Revere Commuter Rail Station		✓	
South Salem Commuter Rail Station		✓	
Winthrop to Boston Ferry Service		✓	
Salem-Danvers via Peabody Commuter Rail Service		✓	
Newburyport/Rockport Line Coaches		✓	✓
Newburyport Branch and Rockport Branch Station Improvement Program			✓
Newburyport Branch and Rockport Branch Highway Grade Crossing Improvements/ Elimination Program			✓
Beverly to Boston DMU/Shuttle Service			✓
Newburyport Branch and Rockport Branch Signal System Upgrades			✓
Second Salem Tunnel			✓
Salem to Boston Ferry Service			✓

3.0 Relation of MIS to Other MBTA Processes

The MBTA recently completed the 2003 Program for Mass Transportation (PMT). The PMT is a central element of capital planning at the MBTA, and is the foundation for transit infrastructure planning and programming in Eastern Massachusetts. The PMT defines a vision for regional mass transportation and sets priorities for infrastructure investments in the areas of system preservation, service enhancements, and system expansion. The PMT is a financially-unconstrained, objective evaluation of project ideas. As the long-range "master plan" for the MBTA, the PMT spells out the MBTA's investment priorities for addressing system preservation and maintenance, yet recognizes the increasing demand for enhanced and expanded service.

The North Shore MIS plays an important role within the MBTA's capital planning process, as it presents further detail related to the prioritized transit needs of the North Shore. Through greater analysis and consensus building, the MIS provides the MBTA with a more informed prioritization of potential transit investments for the North Shore.

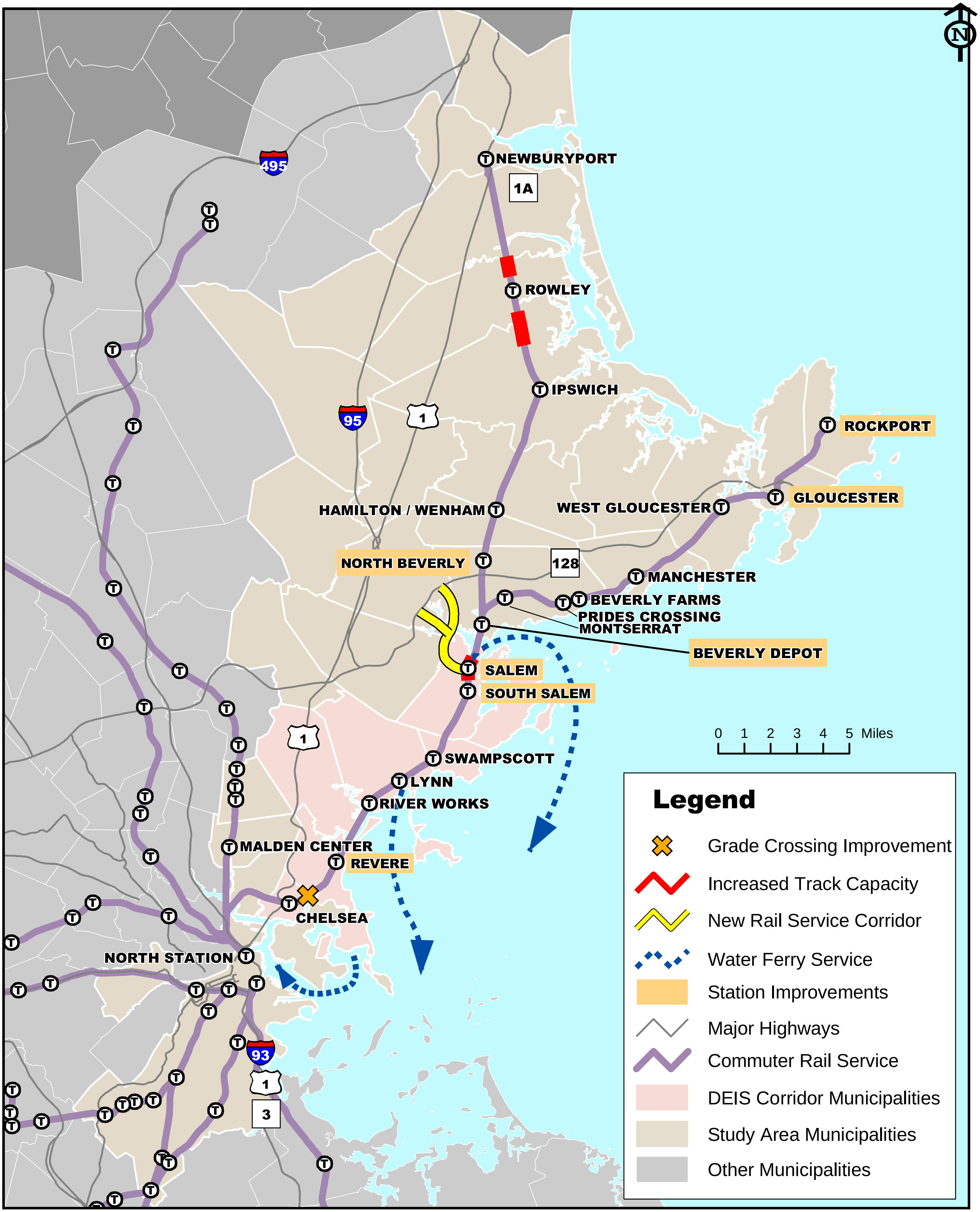

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Figure ES-1
Project Locations

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Chapter 1

Overview of the MIS Process

Overview of MIS Process

1.0 Overview

Consensus for the best mix of transit investments has been difficult to achieve on the North Shore despite the Massachusetts Bay Transportation Authority's (MBTA) previous efforts to develop solutions for the Corridor's transportation problems. Over the last decade, MBTA studies have attempted to evaluate the North Shore on a regional basis, but have evolved into processes that support individual projects. The purpose of the North Shore Transit Improvements Project-Major Investment Study (MIS) is to identify the priorities for transit system investments in the study area and to achieve consensus around a strategy for making transportation improvements to address regional mobility needs.

The MIS study area includes 32 communities from Boston to the New Hampshire border. The MIS offered the opportunity for a current evaluation of multi-modal alternatives and for a more inclusive process that has allowed stakeholders to participate in an open and collaborative process. Through the MIS process, communities have brought multiple visions, investment ideas, and concerns to the table. The identified needs for public transit investment vary throughout the region. In particular, more northern communities seek to enhance existing accessibility through improved commuter rail service and more parking. In the southern portion of the study area several communities identify rapid transit investment as a way to address significant accessibility problems that prevent greater economic growth.

2.0 Review of Previous Studies

Several studies have been conducted in the last decade regarding transit services in the North Shore area. These reports include:

- ***North Shore Transportation Study -*** *This 1995 study culminated in a report titled "*Planning Report and Alternatives Analysis: North Shore Transportation Study". *The study analyzed four transit alternatives for consideration. They included an enhanced rail/bus with busway, Coastal Corridor Light Rail System, Major Commuter Rail Improvements with Blue Line connections, and a Blue Line extension.*

- **Blue Line Extension to Beverly -** This report was prepared in response to public comments received on the 1995 study requesting the analysis of one additional alternative. The final report was published in 1997, entitled "North Shore Transportation Study: Blue Line Extension to Beverly". This report recommended two potential alternatives for extending the Blue Line to Beverly: an extension along the Blue Line Main Line via Wonderland Station and an extension along the Blue Line Main Line via Revere Beach Station. These routes would lead to separate Beverly and Wonderland Branches.

- **Wonderland Connector Feasibility Study** - In 1998 the MBTA released the "Wonderland Connector Feasibility Study". The purpose of the 1998 study was to evaluate various options for connections between the Blue Line and the Commuter Rail Line near Wonderland Station. The following five connections made up the "short list" of recommended potential alternatives that connect Wonderland to a new Commuter Rail station in Revere:

    - Blue Line South connection from Revere Beach Station to New Revere Station
    - Blue Line North extension to new Revere Station
    - Automated People Mover
    - At-Grade Pedestrian Walkway
    - Busway between Lynn Parking Garage (Central Square) and Wonderland Station

This work served as a valuable starting place for the MIS consensus-building process.

3.0 Development of the MIS

Steering Committee

For the MIS, the MBTA established a 15 member project Steering Committee, which was made up of elected officials or their representatives, as well as other major constituency groups from the areas of business, education, environment, labor, social services, and transportation sectors. The purpose of this group has been to represent various interests on the North Shore and to assist the MBTA in identifying goals and objectives, as well as be involved in the decision-making process related to projects. This approach has aimed to facilitate consensus in the decision making and implementation-oriented planning.

A number of the early Steering Committee meetings for the MIS focused on developing goals for the MIS analysis. These goals, finalized at a meeting in May 2001, are categorized into community, transportation, economic, environmental, and design areas as noted below:

Improve Community Access
- Access to Logan Airport
- Access to Employment Centers
- Intercommunity Access
- Improved Access to Boston
- Provide Service for North Shore Commuter Students
- Access during Off-peak (inbound & outbound)
- Services for Transit Dependent Populations

Upgrade Existing North Shore Service
- Improve Transit Feeder Service
- Add more Transit Stops
- Increased Commuter Rail Frequency
- Better Intermodal Connections/Stations
- Additional Parking Capacity
- Additional Transit Capacity
- Provide More User-Friendly Service

Promote North Shore Economic Growth
- Encourage New Employers to North Shore
- Keep North Shore Town Centers and Businesses Accessible
- Promote Tourist Connections to the North Shore

Minimize Environmental Impacts
- Air Quality Standards
- Reduce Roadway Congestion

Encourage Community Oriented Design
- Multi-use Design
- Promote Bicycle and Walk Alternatives
- Focus on Station Design to Promote Livability in Urban Centers

With the help of the Steering Committee, the MBTA was able to develop these consensus-based set of goals and objectives for the North Shore. These goals and objectives were used as one component in the project evaluation process.

Public Outreach

Since the North Shore Transit Improvements Project-Major Investment Study (MIS) kickoff meeting was held on February 26, 2001 at Peabody City Hall to introduce the project to local, state, and federal officials, a variety of strategies have been implemented to keep the public both informed and involved during the study process including regular Steering Committee Meetings; Public Meetings; briefings with key stakeholders; and a survey of MBTA riders.

Steering Committee

Twenty-six steering committee meetings have been held during the course of the MIS process. These meetings, which were open to the public, were regularly held almost monthly, and were designed to provided an opportunity for the MBTA and Project Team to update the Steering Committee on the progress of the study, and gain consensus on critical project issues such as the approach, goals, alternatives, and evaluation criteria.

Public Meetings

A number of public meetings have been held at strategic points during the course of the MIS to keep the general public advised of the progress of the study and to gain additional input. Some of these meetings have been held at the specific request of neighborhood organizations. At most meetings, Project Team members were available for questions at an Open House, before the meeting begins. The following meetings were held:

- ☐ June 11, 2001 – Peabody;
- ☐ June 13, 2001 – Lynn;
- ☐ September 13, 2001 – Gloucester;
- ☐ May 29, 2002 – Salem;
- ☐ June 5, 2002 – Beverly;
- ☐ March 12, 2003 – Peabody; and,
- ☐ April 7, 2004 – Peabody (scheduled).

MBTA Rider Survey

In October 2001, a one-page, written questionnaire was distributed to 3,500 MBTA riders (with a response rate of 38%) asking them to identify existing transportation needs and to suggest transportation improvements on the North Shore. The survey was distributed on the Newburyport and Rockport Commuter Rail lines, the Blue Line, and several MBTA bus stops. Comments focused on boardings, destinations, passenger information, alternatives, and service.

Other Coordination

Throughout the MIS process, MBTA officials and the Project Team have also met with state legislators, local boards of selectmen, local community organizations, conservation commissions, and local planning departments.

4.0 Revere to Salem Corridor-Draft Environmental Impact Statement

Two kinds of needs for transit improvements have emerged from the extensive public process related to this study. Areas from Salem north are better served by improved access to Boston through upgrades to the existing commuter rail system. Lack of highway access for areas from Salem south suggests an investment in a high-density type of transit service. Because of these differing needs and associated solutions, this MIS was expanded to include a Draft Environmental Impact Statement (DEIS) for the

Revere to Salem Corridor. Please refer to the North Shore Transit Improvements Draft Environmental Impact Statement (DEIS) Report for a detailed analysis of DEIS alternatives.

5.0 Focus of MIS

The MIS continued to evaluate needs, potential solutions and projects for the entire study area with particular emphasis on the area north of Salem.

Through the extensive public outreach, the MBTA and Steering Committee developed the following Universe of Projects for the MIS:

- Gloucester Station Improvements
- Beverly Depot Station Improvements
- Salem Station Improvements
- Winthrop to Boston Ferry Service
- North Shore Bus System Improvements
- Newburyport Branch and Rockport Branch Increased Frequencies
- Rockport Station Improvements
- Lynn to Boston Ferry Service
- Revere Commuter Rail Station
- South Salem Commuter Rail Station
- Salem-Danvers via Peabody Commuter Rail Service
- Newburyport/Rockport Line Coaches
- Newburyport Branch and Rockport Branch Station Improvement Program
- Newburyport Branch and Rockport Branch Highway Grade Crossing Improvements/ Elimination Program
- Beverly to Boston DMU/Shuttle Service
- Newburyport Branch and Rockport Branch Signal System Upgrades
- Second Salem Tunnel
- Salem to Boston Ferry Service

6.0 Relation of MIS to Other MBTA Processes

The MBTA recently completed the 2003 Program for Mass Transportation (PMT). The PMT is a central element of capital planning at the MBTA, and is the foundation for transit infrastructure planning and programming in Eastern Massachusetts. The PMT defines a vision for regional mass transportation through a financially-unconstrained, objective evaluation of project ideas. As the long-range "master plan" for the MBTA, the PMT spells out the MBTA's investment priorities for addressing system preservation and maintenance, yet recognizes the increasing demand for enhanced and expanded service. Making the case for expansion funding compels the MBTA and transit advocates to evaluate and prioritize ideas based on cost-effective, needs-based criteria.

The North Shore Transit Improvements Project-MIS plays an important role within the MBTA's capital planning process, as it presents further detail related to the prioritized transit needs of the North Shore. Through greater analysis and consensus building, the MIS provides the MBTA with a more informed prioritization of potential transit investments for the corridor.

7.0 MIS Organization

The MIS is organized into four chapters. Chapter 2 details the existing conditions within the 32 community project study area, including information such as existing land use, infrastructure, demographics, MBTA operations/service, and previous studies. Chapter 3 provides assessments for the alternatives evaluated in the MIS. Finally, Chapter 4 provides a summary of and basis for project recommendations, which are categorized as short, medium, or long-term priorities.

Chapter 2

Existing Conditions

2.1 North Shore Overview

The North Shore study area includes the City of Boston and 31 other cities and towns situated to the north and northeast of Boston (see Figure 2-1). According to 2000 Census data, the total population of the study area, including the City of Boston, is approximately 1.27 million people. Overall, the study area experienced a population growth of almost five percent between 1990 and 2000, with some towns experiencing stronger growth rates than others. A few communities lost population during the ten-year period.

Major highways in the study area include Interstate 95, U.S. Route 1, and Massachusetts Route 128. Transit services on the North Shore include services provided by the Massachusetts Bay Transportation Authority (MBTA) and other local operators. The MBTA provides commuter rail service to the North Shore via the Eastern Route Main Line (ERML) extending to Newburyport and Rockport. Additionally, several communities in the southern portion of the study area are located along the Haverhill commuter rail line. Rapid transit service is provided on the Blue Line between Bowdoin station in downtown Boston and Wonderland station in Revere. The MBTA and other local transit providers operate local bus routes throughout the North Shore and some express routes to downtown Boston. Private motor coach carriers also operate inter-city and express bus routes from the northern study area communities into downtown Boston. The Cape Ann Transit Authority (CATA) provides additional local bus transit service in Gloucester, Rockport, and other Cape Ann communities. In addition, the Massachusetts Port Authority provides direct access from Peabody to Logan Airport via its Logan Express Service.

The most recent major expansion of public transportation in the study area was the eight-mile northward extension of the Ipswich commuter rail line to a new terminus at Route 1 in Newburyport. Service on the Newburyport extension began in 1997 and included new stations at Rowley and Newburyport. This extension represented a restoration of passenger service on a route that had been discontinued in 1984. The MBTA has also continued to make investments to upgrade and rehabilitate Blue Line rapid transit facilities. In the 1990s, a Blue Line modernization program was initiated. As part of this program, several Blue Line stations were reconstructed to provide improved accessibility, and the MBTA is continuing to work to complete the Blue Line modernization program. In addition, procurement of new Blue Line vehicles will replace the existing fleet began in 2001, and will allow the MBTA to run six car train sets.

2.2 DEMOGRAPHICS

With a current population of over 1.2 million, the North Shore Transit Improvements Project-MIS study area incorporates a diverse range of communities including old core cities, inner suburbs of Boston, historic coastal towns, new suburban subdivisions, and rural areas. The region varies greatly in affluence, economic activity, and character. This variation is characterized by:

- ☐ a still substantial but declining commercial and industrial base combined with older housing centered in Lynn and other dense areas nearer Boston;
- ☐ shopping centers and extensive residential development in parts of Peabody, Topsfield, Swampscott, and other areas along Route 128;
- ☐ agriculture, large estates, and historic village centers in Essex, Hamilton and Wenham; and,
- ☐ tourist and recreational development extending along the entire coast, focusing on Newburyport, Salem, and Revere.

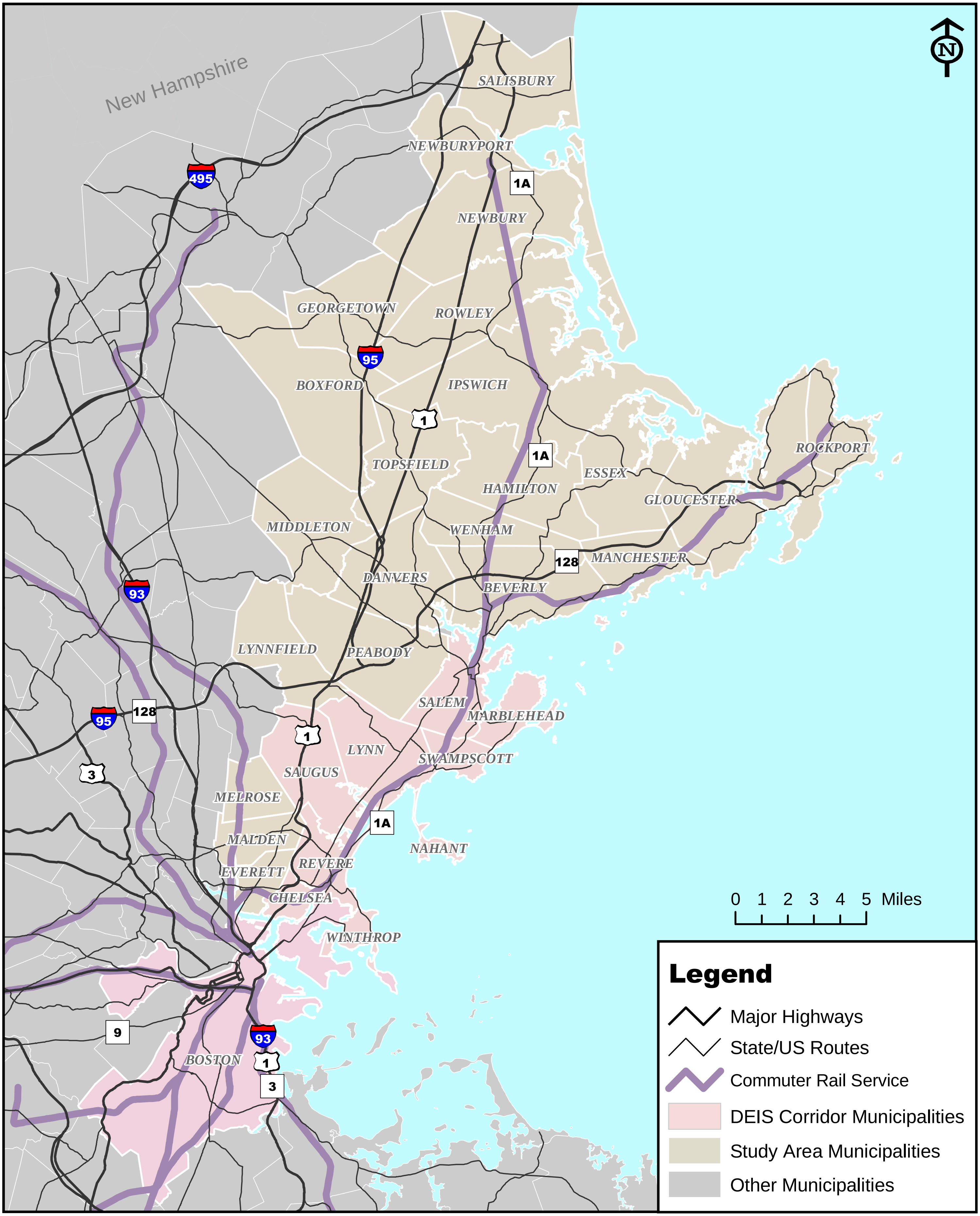

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Figure 2-1
North Shore Study Area

Parsons Brinckerhoff 100 YEARS

DMJM HARRIS

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Table 2-1 lists population, land area, and population density statistics for all 32 North Shore Study Area communities. Figure 2-2 depicts the population density within each town or city south of Beverly. Density is depicted by traffic analysis zones (TAZs), a geographic unit used for transportation analysis in the Boston region's transportation model. Among the communities that are the focus of the MIS, Malden, Revere, Winthrop and portions of Salem, Beverly, and Peabody experience high population density (see Figure 2-2). The least densely populated communities are Topsfield, Ipswich, Boxford, Rowley, Newbury, and Essex, each with less than 500 people per square mile.

Table 2-1 North Shore Communities Population Densities

City / Town	Population	Land Area (Sq. Mi.)	Population Density (Pop. / Sq. Mi.)
Beverly	39,862	15.4	2,582
Boston	589,141	48.4	12,167
Boxford	7,921	24.0	330
Chelsea	35,080	2.2	16,018
Danvers	25,212	13.3	1,898
Essex	3,267	14.2	231
Everett	38,037	3.4	11,254
Georgetown	7,377	12.9	570
Gloucester	30,273	26.0	1,166
Hamilton	8,315	14.6	570
Ipswich	12,987	32.6	398
Lynn	89,050	10.8	8,238
Lynnfield	11,542	10.2	1,137
Malden	56,340	5.1	11,069
Manchester	5,228	7.8	667
Marblehead	20,377	4.5	4,498
Melrose	27,134	4.7	5,773
Middleton	7,744	14.0	554
Nahant	3,632	1.2	2,929
Newbury	6,717	24.3	277
Newburyport	17,189	8.4	2,051
Peabody	48,129	16.4	2,935
Revere	47,283	5.9	7,987
Rockport	7,767	7.1	1,099
Rowley	5,500	18.7	294
Salem	40,407	8.1	4,989
Salisbury	7,827	15.4	507
Saugus	26,078	11.0	2,373
Swampscott	14,412	3.1	4,725
Topsfield	6,141	12.7	485
Wenham	4,440	7.7	575
Winthrop	18,303	2.0	9,197

Source: U.S. Census, 2000

Note: Bolded text communities are the focus of the MIS report. Unbolded communities are highlighted in the DEIS.

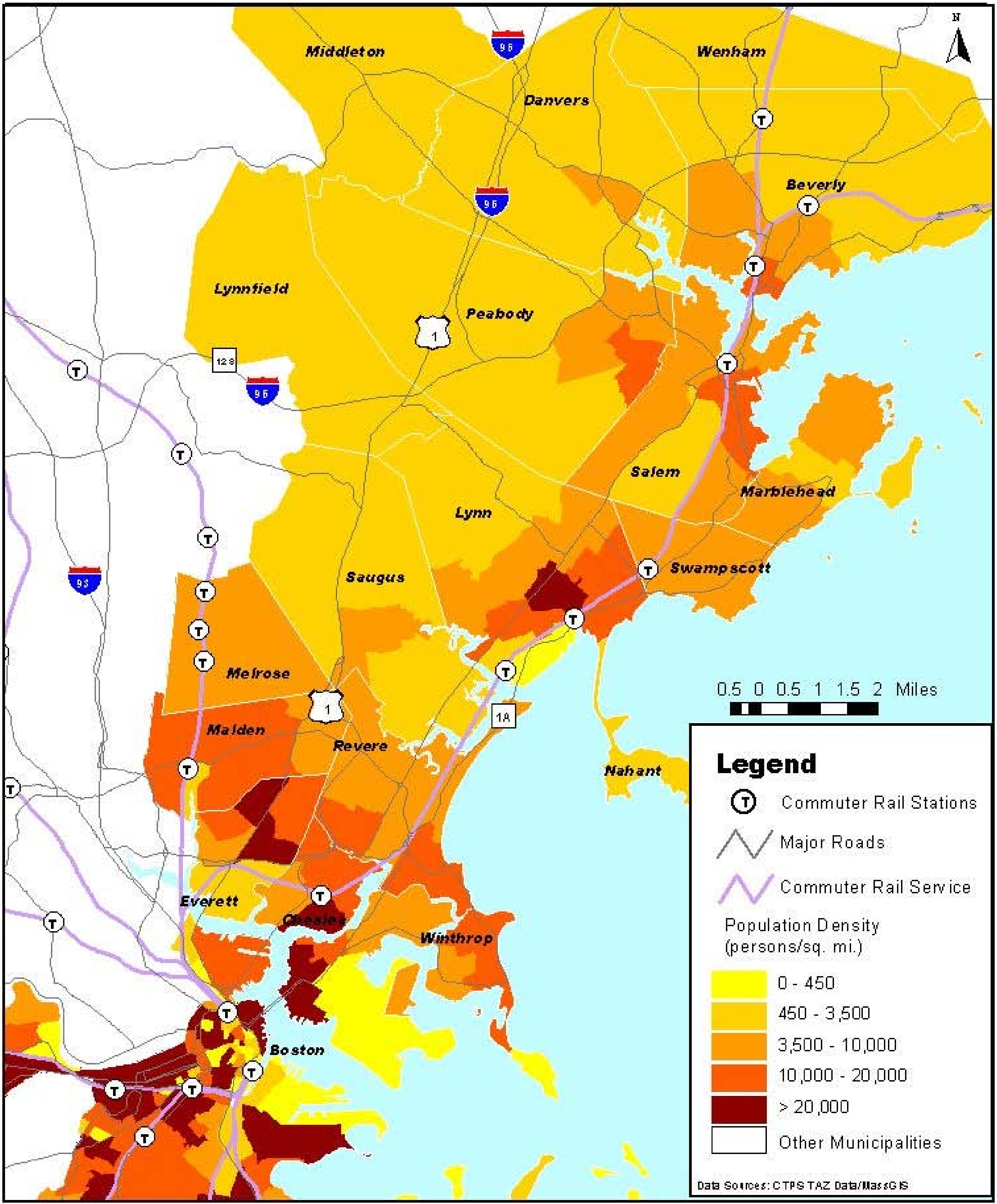

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Figure 2-2
Population Density by TAZ

Parsons Brinckerhoff

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Boston is the economic hub of the Commonwealth of Massachusetts and the New England region. It is a direct source of employment and income well beyond the City's limits. Boston comprises nearly 21 percent of the state's jobs and 10 percent of the employment opportunities of the six New England states[1]. Over the last two decades, Boston's economy has shifted from manufacturing to a service based economy. The metropolitan area primarily specializes in financial, government, business, and professional services, as well as educational and medical institutions. Suburban areas are specialized in the high technology and defense-related industries. Significant employment gains have occurred primarily in financial securities, health, educational, cultural, non-professional business, and professional business sectors in the Boston region.

Along with the changes in the regional economy, there has been a change in the labor force composition. The larger economy has increased the labor force participation, of women, minorities, youth, and the elderly.

Employment in the North Shore is depicted in Figure 2-3. Employment is measured as the number of jobs estimated by U.S. Census in the 1996 Census for each of the 32 towns in the North Shore study area. Notable on the figure is the concentration of employment at Logan International Airport and at the General Electric Plant in Lynn. Table 2-2 provides a summary of jobs within each of the study area communities.

The annual unemployment rate for the State of Massachusetts is 2.6 percent and the annual unemployment rates for the 32 communities range from 1.0 percent in the Town of Wenham to 3.9 percent in the City of Chelsea (See Table 2-3). In general, the higher annual unemployment rates occur in the urban core, while the Route 128 and Interstate 495 communities have lower annual rates. The average annual unemployment rate for the urban core communities is 3.0 percent while the average rates for the Route 128 communities and Interstate 495 communities are 2.0 and 2.2, respectively.

The number of commuters[2] to Boston from the North Shore is depicted in Figure 2-4. In general, the number of commuters to Boston decreases as the distance from Boston increases. Notable exceptions are Gloucester and Newburyport, towns which host commuter rail stations.

2.3 Land Use

The North Shore Study Area consists of approximately 423 square miles[3] of land area. The major uses are open space (forest, etc.) and residential (30%), followed by wetlands (9%) recreation (6%), commercial (5%), transportation (3%) and water (3%). (See Table 2-4 and Figure 2-5) What is characterized as the Urban Core sub-region by the Metropolitan Area Planning Commission (MAPC) had the largest concentration of commercial and industrial land uses in the study area with 46.1 percent, Route 128 a concentration of residential land use with 38 percent, and I-495 the largest agricultural, forest, and open space land use with 78.5 percent.

Boston has the largest concentration of commercial/industrial land uses with 7.5 square miles, followed by Peabody and Danvers with 1.72 and 1.63 square miles, respectively. Boston also has the largest concentration of residential land use with slightly over 20 square miles, followed by Lynnfield and Peabody with approximately 8.5 square miles and 7.2 square miles.

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[1] Boston's Strong Economy-2000

[2] A commuter is a person traveling from their place of residence to their place of employment.

[3] Land use composition is derived from MASSGIS land use data.

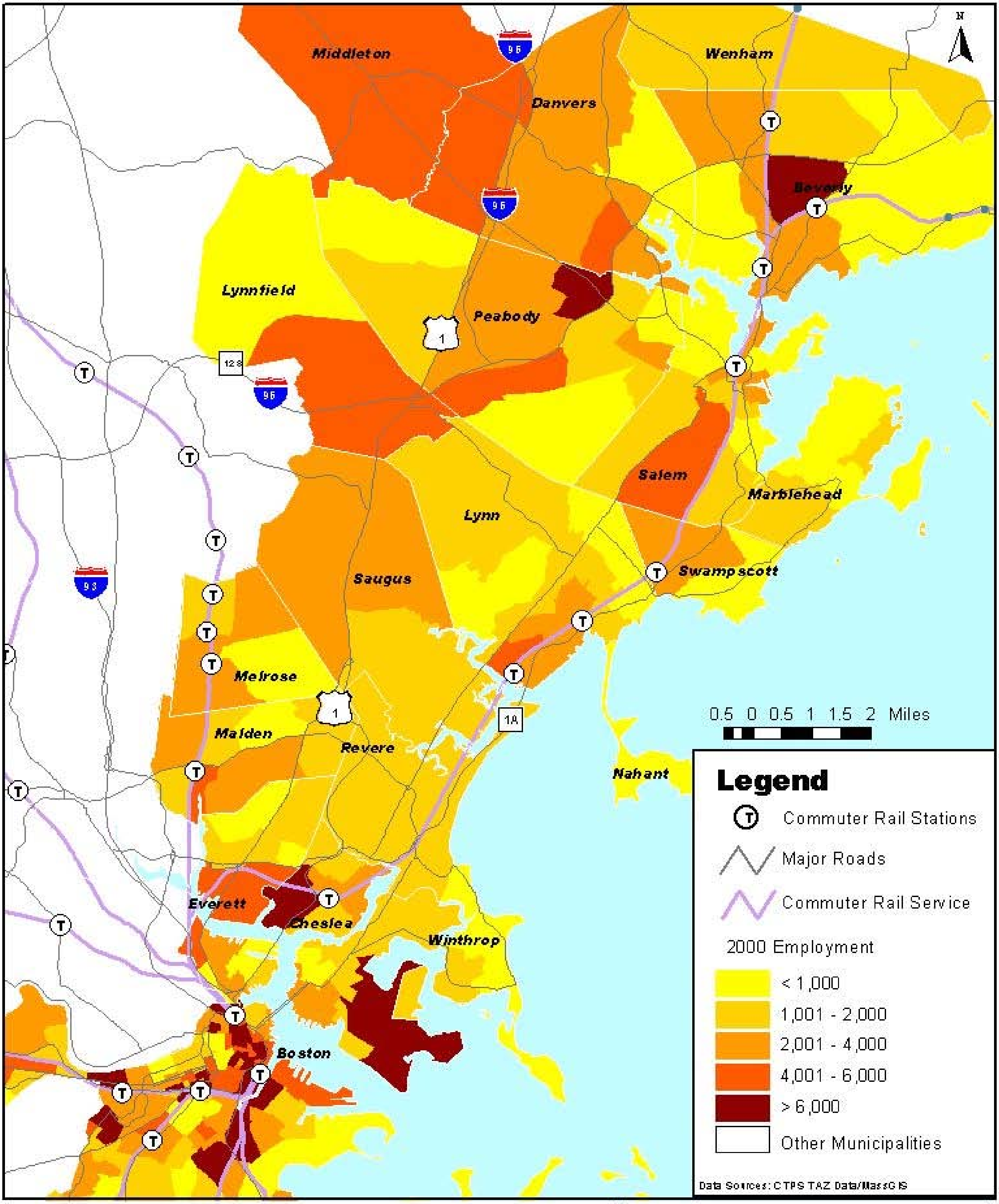

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Figure 2-3
2000 Employment by TAZ

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Table 2-2 Employment Composition within North Shore Study Area, 2000

Cities	Total Employment	Basic		Retail		Service	
		Employees	Pct.	Employees	Pct.	Employees	Pct.
BOSTON	583,922	104,727	18%	57,813	10%	421,382	72%
CHELSEA	13,116	6,338	48%	1,450	11%	5,328	41%
EVERETT	10,398	5,141	49%	1,142	11%	4,115	40%
MALDEN	17,506	6,240	36%	2,807	16%	8,459	48%
REVERE	8,777	2,591	30%	2,751	31%	3,435	39%
WINTHROP	2,470	115	05%	314	13%	2,041	83%
Total Urban Core	**636,189**	**125,152**	**20%**	**66,277**	**10%**	**444,760**	**70%**
BEVERLY	19,485	5,117	26%	3,646	19%	10,722	55%
DANVERS	23,039	6,873	30%	6,387	28%	9,779	42%
LYNN	25,271	8,674	34%	3,167	13%	13,430	53%
LYNNFIELD	5,177	1,097	21%	1,154	22%	2,926	57%
MARBLEHEAD	4,934	895	18%	1,058	21%	2,981	60%
MELROSE	6,555	1,174	18%	947	14%	4,434	68%
NAHANT	367	31	09%	125	34%	211	57%
PEABODY	26,897	8,402	31%	7,745	29%	10,750	40%
SALEM	18,596	3,353	18%	3,359	18%	11,884	64%
SAUGUS	11,049	1,999	18%	6,480	59%	2,570	23%
SWAMPSCOTT	3,359	542	16%	1,252	37%	1,565	47%
Total Route 128	**60,268**	**14,328**	**24%**	**18,960**	**31%**	**26,980**	**45%**
BOXFORD	929	226	24%	36	4%	667	72%
ESSEX	1,386	412	30%	486	35%	488	35%
GEORGETOWN	2,429	1,197	49%	309	13%	923	38%
GLOUCESTER	11,457	4,637	40%	2,075	18%	4,745	41%
HAMILTON	1,443	150	10%	263	18%	1,030	711%
IPSWICH	3,848	1,317	34%	696	18%	1,835	48%
MANCHESTER	1,475	284	19%	264	18%	927	63%
MIDDLETON	4,874	1,895	39%	882	18%	2,097	43%
NEWBURY	1,261	327	26%	194	15%	740	59%
NEWBURYPORT	10,185	3,478	34%	2,180	21%	4,527	44%
ROCKPORT	1,497	188	13%	402	27%	907	61%
ROWLEY	2,364	980	41%	690	29%	694	29%
SALISBURY	2,731	1,041	38%	856	31%	834	31%
TOPSFIELD	2,458	718	29%	282	11%	1,458	59%
WENHAM	1,187	69	06%	0	0%	1,118	94%
Total I-495	**49,524**	**16,921**	**34%**	**9,613**	**19%**	**22,990**	**46%**
Total Study Area	**1,576,423**	**336,633**	**21%**	**206,058**	**13%**	**1,033,732**	**66%**

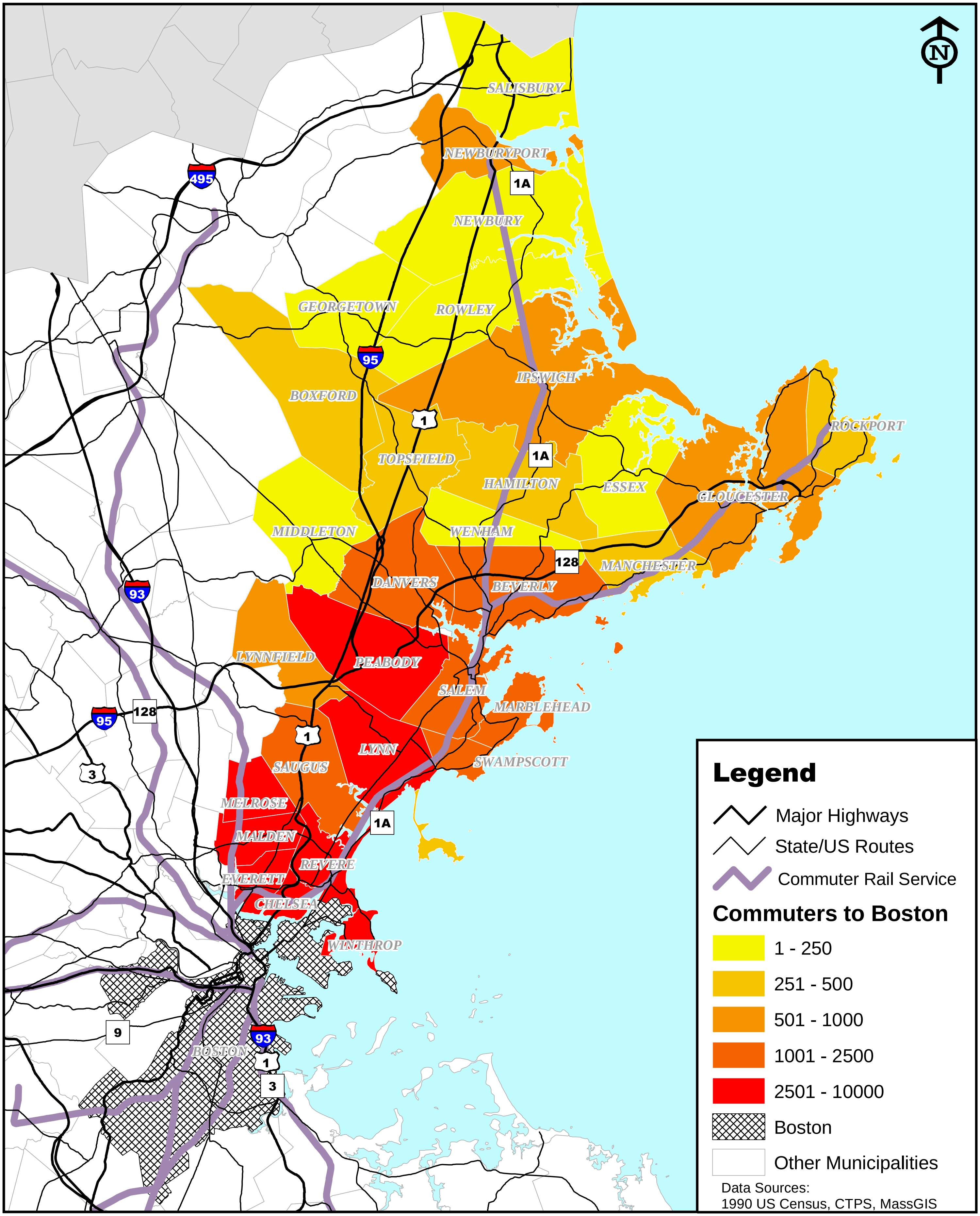
Source: Central Transportation Planning Staff (CTPS)
Note: Bolded text communities are the focus of the MIS report. Unbolded communities are highlighted in the DEIS.

Table 2-3 Unemployment for State and by City

City	2002 (not seasonally adjusted)		2003 (not seasonally adjusted)	
	RATE	UNEMPLOYMENT	RATE	UNEMPLOYMENT
Massachusetts	**5.3%**	**185,100**	**5.8%**	**198,300**
URBAN CORE				
Boston	5.8%	18,141	6.0%	18,710
Chelsea	8.1%	1,065	7.9%	1,228
Everett	6.0%	1,160	6.9%	1,378
Malden	5.5%	1,708	6.2%	1,946
Revere	6.5%	1,458	7.2%	1,730
Winthrop	5.0%	533	5.7%	598
ROUTE 128				
Beverly	4.3%	995	4.6%	1,018
Danvers	4.1%	630	5.0%	711
Lynn	6.6%	2,703	7.6%	3,220
Lynnfield	3.5%	231	4.3%	272
Marblehead	3.9%	492	3.9%	457
Melrose	4.5%	723	4.9%	717
Nahant	4.9%	108	5.3%	105
Peabody	4.5%	1,295	5.2%	1,404
Salem	5.6%	1,270	6.2%	1,427
Saugus	4.6%	716	6.0%	873
Swampscott	4.3%	330	4.8%	362
ROUTE 495				
Boxford	3.6%	193	4.3%	193
Essex	4.1%	84	4.9%	92
Georgetown	4.4%	202	5.3%	227
Gloucester	6.5%	1,098	7.1%	1,167
Hamilton	3.6%	144	4.0%	108
Ipswich	3.9%	294	5.1%	369
Manchester	3.7%	118	4.4%	126
Middleton	4.2%	156	3.3%	162
Newbury	4.5%	161	4.9%	181
Newburyport	5.1%	518	5.4%	536
Rockport	5.0%	216	5.8%	240
Rowley	4.6%	154	4.8%	154
Salisbury	7.2%	303	7.4%	316
Topsfield	3.5%	115	3.4%	107
Wenham	3.2%	84	3.3%	78

Source: Massachusetts Division of Employment and Training, 2004

Note: Bolded text communities are the focus of the MIS report. Unbolded communities are highlighted in the DEIS.



MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 2-4
Commuters to Boston

Parsons Brinckerhoff 100 YEARS

DMJM HARRIS

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Table 2-4 North Shore Land Use Type (Square Miles)

City/TOWN		Agriculture/Forest/ Open Space		Commercial/Industrial		Miscellaneous		Residential		Recreation/Spectator/ Urban		Transportation		Water		Wetlands/Marsh- lands	
	Total Sq Miles	Sq. Miles	Pct.	Sq. Miles	Pct.	Sq. Miles	Pct.	Sq. Miles	Pct.	Sq. Miles	Pct.	Sq. Miles	Pct.	Sq. Miles	Pct.	Sq. Miles	Pct.
Beverly	15.68	6.05	38.6%	0.85	5.4%	0.09	0.6%	6.43	41.0%	1.09	7.0%	0.48	3.1%	0.37	2.4%	0.32	2.0%
Boston	49.40	4.03	8.2%	7.40	15.0%	0.53	1.1%	20.24	41.0%	9.29	18.8%	6.33	12.8%	1.10	2.2%	0.49	1.0%
Boxford	24.44	16.32	66.8%	0.04	0.2%	0.03	0.1%	5.90	24.2%	0.45	1.8%	0.36	1.5%	0.65	2.6%	0.69	2.8%
Chelsea	2.20	0.02	0.7%	0.76	34.5%	0.03	1.2%	0.82	37.4%	0.30	13.4%	0.26	11.9%	0.01	0.4%	0.01	0.5%
Danvers	13.77	3.99	29.0%	1.63	11.8%	0.00	0.0%	5.49	39.9%	0.87	6.3%	0.82	6.0%	0.53	3.8%	0.44	3.2%
Essex	14.29	8.60	60.2%	0.13	0.9%	0.00	0.0%	1.67	11.7%	0.15	1.1%	0.02	0.1%	0.21	1.5%	3.50	24.5%
Everett	3.53	0.04	1.0%	0.83	23.6%	0.02	0.5%	1.59	45.1%	0.52	14.7%	0.43	12.2%	0.08	2.2%	0.02	0.6%
Georgetown	13.14	7.89	60.0%	0.25	1.9%	0.09	0.7%	3.38	25.7%	0.36	2.8%	0.27	2.1%	0.18	1.4%	0.72	5.5%
Gloucester	26.89	15.26	56.7%	0.58	2.2%	0.07	0.3%	6.91	25.7%	0.73	2.7%	0.39	1.4%	0.95	3.5%	2.00	7.4%
Hamilton	14.95	9.80	65.5%	0.05	0.4%	0.01	0.1%	3.19	21.3%	0.54	3.6%	0.00	0.0%	0.35	2.4%	1.01	6.8%
Ipswich	33.09	19.10	57.7%	0.47	1.4%	0.12	0.4%	4.49	13.6%	0.76	2.3%	0.03	0.1%	1.18	3.6%	6.93	21.0%
Lynn	11.46	2.88	25.1%	1.44	12.6%	0.05	0.5%	4.98	43.5%	1.20	10.5%	0.10	0.9%	0.74	6.4%	0.06	0.6%
Lynnsfield	20.93	8.22	39.3%	0.39	1.9%	0.00	0.0%	8.49	40.6%	1.39	6.6%	0.44	2.1%	0.70	3.4%	1.30	6.2%
Malden	5.07	0.44	8.6%	0.81	16.0%	0.06	1.2%	3.05	60.1%	0.63	12.5%	0.07	1.4%	0.01	0.2%	0.01	0.2%
Manchester	7.81	4.45	57.0%	0.10	1.2%	0.02	0.3%	2.46	31.5%	0.27	3.5%	0.21	2.7%	0.14	1.7%	0.16	2.0%
Marblehead	4.45	0.56	12.6%	0.16	3.6%	0.00	0.0%	3.18	71.5%	0.40	8.9%	0.00	0.1%	0.10	2.3%	0.04	1.0%
Melrose	4.77	0.99	20.8%	0.25	5.3%	0.03	0.6%	2.79	58.5%	0.57	12.0%	0.02	0.5%	0.08	1.7%	0.03	0.5%
Middleton	14.50	9.61	66.3%	0.47	3.3%	0.10	0.7%	2.63	18.1%	0.36	2.5%	0.04	0.3%	0.34	2.3%	0.96	6.6%
Nahant	1.41	0.09	6.7%	0.01	0.9%	0.00	0.0%	0.64	45.4%	0.16	11.6%	0.39	27.5%	0.10	7.0%	0.02	1.1%
Newbury	23.42	11.63	49.7%	0.10	0.4%	0.06	0.2%	3.22	13.8%	0.35	1.5%	0.00	0.0%	0.23	1.0%	7.83	33.4%
Newburyport	8.41	3.40	40.4%	0.85	10.1%	0.03	0.4%	2.74	32.6%	0.46	5.5%	0.30	3.6%	0.15	1.8%	0.48	5.7%
Peabody	16.80	4.68	27.9%	1.72	10.2%	0.34	2.0%	7.18	42.8%	1.01	6.0%	0.82	4.9%	0.47	2.8%	0.58	3.4%
Revere	5.71	0.25	4.4%	0.61	10.7%	0.06	1.0%	2.87	50.2%	0.46	8.0%	0.52	9.1%	0.07	1.3%	0.87	15.3%
Rockport	7.16	4.28	59.8%	0.11	1.5%	0.05	0.7%	1.98	27.7%	0.23	3.3%	0.03	0.4%	0.24	3.4%	0.24	3.3%
Rowley	18.48	10.87	58.8%	0.29	1.6%	0.09	0.5%	2.86	15.5%	0.25	1.4%	0.06	0.3%	0.14	0.7%	3.93	21.3%
Salem	8.15	2.22	27.2%	0.82	10.1%	0.09	1.1%	3.03	37.1%	1.25	15.4%	0.33	4.0%	0.15	1.8%	0.26	3.2%
Salisbury	15.43	7.07	45.8%	0.57	3.7%	0.19	1.2%	2.53	16.4%	0.27	1.8%	0.28	1.8%	0.32	2.1%	4.20	27.2%
Saugus	11.37	3.57	31.4%	0.68	6.0%	0.40	3.5%	4.18	36.7%	0.48	4.2%	0.33	2.9%	0.49	4.3%	1.24	10.9%
Swampscott	3.04	0.49	16.2%	0.15	5.0%	0.11	3.6%	1.88	61.9%	0.31	10.3%	0.00	0.1%	0.05	1.6%	0.04	1.3%
Topsfield	12.79	7.66	59.9%	0.12	1.0%	0.06	0.4%	3.24	25.3%	0.48	3.7%	0.08	0.6%	0.05	0.4%	1.10	8.6%
Wenham	8.12	4.98	61.3%	0.03	0.3%	0.00	0.0%	1.85	22.8%	0.33	4.1%	0.08	1.0%	0.46	5.6%	0.39	4.9%
Winthrop	2.04	0.07	3.3%	0.08	4.1%	0.01	0.6%	1.18	57.7%	0.23	11.3%	0.31	15.3%	0.07	3.4%	0.09	4.3%
Total Study Area	**422.68**	**179.51**	**42%**	**22.77**	**5%**	**2.72**	**1%**	**127.05**	**30%**	**26.16**	**6%**	**13.80**	**3%**	**10.71**	**3%**	**39.98**	**9%**

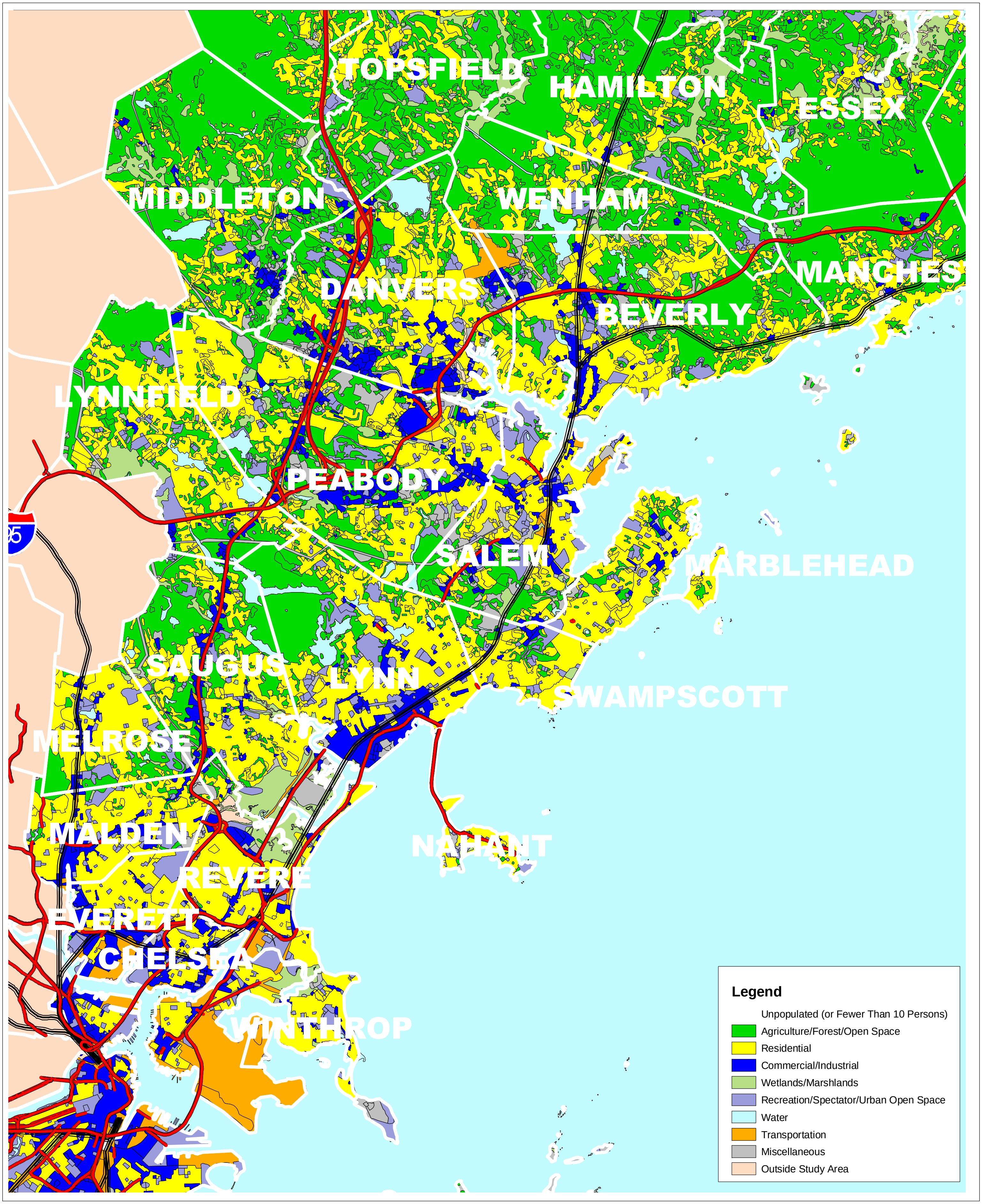
Source: MASSGIS Landuse Cover

Note: Square miles are derived from a MassGIS data set. Rounding error will be reflected from actual square miles.

Percent reflects land use type to city total land use

North Shore Major Investment Study

Figure 2-5 Land Use



INFRASTRUCTURE - RAILROAD AND TRANSIT

2.3.1 Historic and Existing Railroad Corridors

Present day rail transit lines in the study area can trace their origins primarily to the routes constructed in the mid-1880's by the Boston & Maine and Eastern railroads. Competition between the two railroads resulted in the creation of many duplicative and marginally performing lines (notably branch lines) throughout the area. Consolidation of the various lines under Boston & Maine ownership resulted in a "rationalization" of the various routes. However, in many cases the identity of the original owner is perpetuated by the names associated with the various lines and segments. The present-day active rail network includes commuter rail passenger service operated by Amtrak for the MBTA, and freight service provided by Boston & Maine successor, Guilford Transportation. Figure 2-6 depicts the historic and existing railroad rights-of-way in the North Shore Transit Improvements Project-MIS study area.

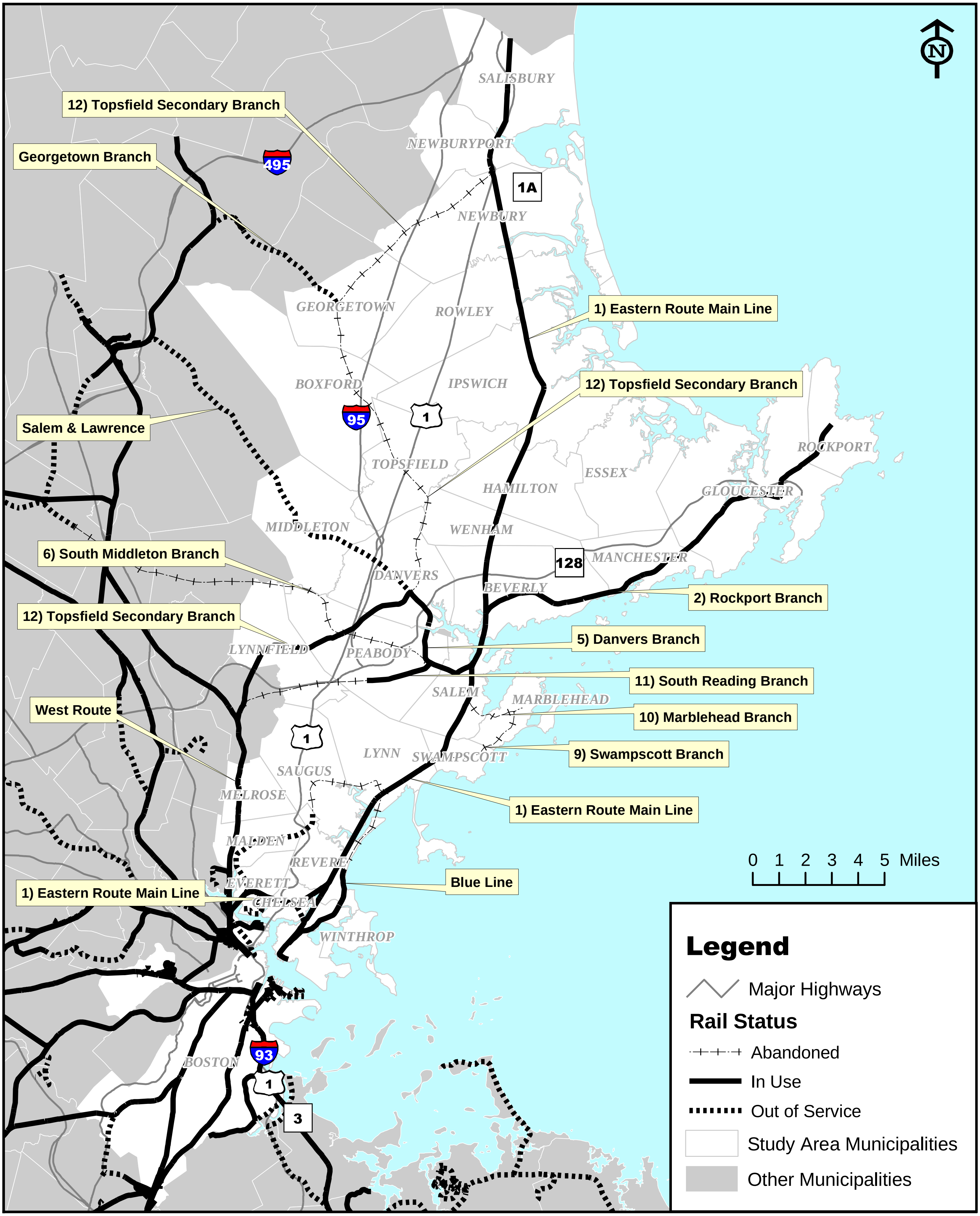
The Federal Railroad Administration (FRA) has developed a track classification system to classify maximum operating speeds for freight and passenger trains given the condition of the track. This measurement is an indicator of the existing quality of the track and supporting structures, and hence the speed and quality of service that can be provided on the track absent any improvements. Table 2-5 below lists these speeds for the various track classifications. The referenced classifications apply to the railroad corridors in the North Shore.

Table 2-5 Maximum Speeds per Railroad Track Classifications

FRA Track Classification	Maximum Freight Train Speed	Maximum Passenger Train Speed
Excepted Track	10 mph	N/A
Class I	10 mph	15 mph
Class 2	25 mph	30 mph
Class 3	40 mph	60 mph
Class 4	60 mph	80 mph
Class 5	80 mph	90 mph
Class 6	NA	110 mph
Class 7	NA	125 mph
Class 8	NA	160 mph
Class 9	NA	200 mph

Source: Federal Railroad Administration, 2001.

FRA standards for Classes 6-9 reflect ongoing development of the so-called high-speed intercity passenger rail services. MBTA commuter rail service typically operates at a maximum train speed of 60-70 mph.



MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 2-6
Railroad Corridors

Parsons Brinckerhoff

DMJM HARRIS

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The following sections describe individual railroad rights-of-way.

2.3.2 Eastern Route Main Line

The Eastern Route Main Line (ERML) was constructed as a 57-mile stretch of track from Boston, Massachusetts to Portsmouth, New Hampshire. The MBTA presently owns all of the ERML in Massachusetts to the New Hampshire border. From Boston, the line travels through Somerville, Everett, Chelsea, Revere, Lynn, Swampscott, Salem, Beverly, Wenham, Hamilton, Ipswich, Rowley, Newbury, and Newburyport, ending in Salisbury.

Active trackage extends 37 miles between Boston and Newburyport, maintained to Class 3 track standards with an allowable maximum speed of 70 mph for passenger trains. There are two 35 mph grade crossings in Chelsea and Everett.

The ERML track serves the Boston to Rockport and Boston to Newburyport commuter services, branching at the Beverly Junction. Commuter service to Newburyport continues on the ERML while commuter service to Rockport is served on the Gloucester Branch (See below). The ERML provides two main line tracks from Boston to the junction at Beverly and a single track with passing sidings from Beverly to Newburyport. Additionally, there is a single track through the 0.8-mile section of the Salem Tunnel. In the early 1900's, a section of the right-of-way (ROW) through Lynn was reconstructed with sufficient width for four tracks. The existing elevated structure at the Lynn commuter rail station dates to 1914.

Springfield Terminal Railway (Guilford Rail System) operates freight service between Somerville and Salem on the ERML.

2.3.3 Rockport Branch

The 16.7 miles of Rockport Branch track is owned by the MBTA, extending from Beverly Junction to Rockport. There are two main line tracks from Beverly Junction to Gloucester and a single track from Gloucester to Rockport. The Gloucester Branch is used only for MBTA commuter rail passenger service.

2.3.4 Danvers Branch

The five-mile Danvers Branch is owned by the MBTA. The Danvers Branch runs from the ERML in Salem northwest through Peabody, and toward Danvers. The single existing Class I track line is operated by Guilford Rail System/Springfield Terminal Railway, and narrows to no more than 25 feet in some places. The Waters River Bridge between Peabody and Danvers has been out of service since being damaged by a fire in 1985. This has effectively severed the line, which required rail freight customers north of the bridge to be served via Wakefield and Danvers Junction and customers in the south via Salem. The ties, rail, and ballast of the Danvers Branch are in deteriorating condition, and are located in a coastal zone adjacent to the North River.

2.3.5 South Middleton Branch

The South Middleton Branch is an abandoned branch that runs from the Danvers Branch from Peabody Center north toward Lowell. The single track that was the South Middleton Branch has been removed. In the Peabody section, the City has acquired the ROW for a sewer easement.

2.3.6 Swampscott Branch

The 4.5-mile Swampscott Branch served the town of Marblehead from a connection with the ERML. The line was abandoned in 1961.

2.3.7 Marblehead Branch

The 3-mile Marblehead Branch served the town of Marblehead via a connection with the ERML at Castle Hill in Salem. The last remnant of the line was abandoned in 1993.

2.3.8 South Reading Branch

The South Reading Branch extended 8 miles between Wakefield Junction and Peabody (connecting with the Danvers Branch at Peabody). Over the past 70 years most of the line has been abandoned. Two miles at the Peabody end of the branch (accessed via the Danvers Branch from Salem) remain in service for an industrial park.

2.3.9 Topsfield Branch

Originally constructed as a competing route to the ERML, this line extended 30 miles from Wakefield Junction northwards via Danvers, Topsfield and Georgetown to Newburyport. Presently only the tracks between Wakefield Junction and Danvers remain in service for freight operations provided by Guilford. The MBTA owns the active ROW, plus the abandoned five-mile ROW between Danvers and Topsfield.

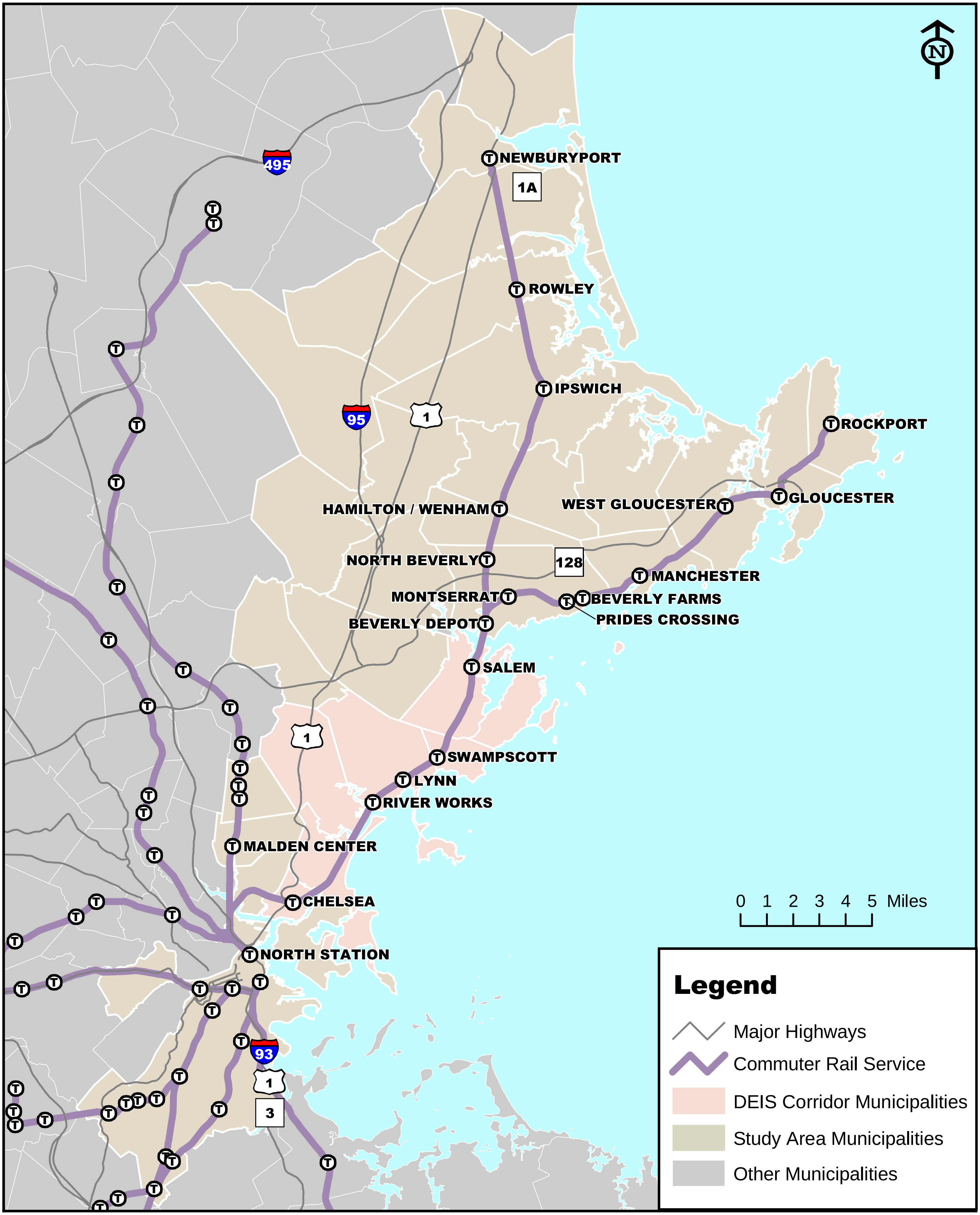
2.4 MBTA Commuter Rail Operations

Commuter Rail service in the Boston metropolitan area has been operated by Amtrak under contract to the MBTA. However, In July 2003 the MBTA entered into a new multi-year contract with a new company, Mass Bay Commuter Rail (MBCR) to operate and maintain the commuter rail system. All commuter rail services provided to the North Shore terminate in Boston’s North Station, located adjacent to the Fleet Center on Causeway Street in Boston.

The North Shore is served by the Newburyport/Rockport Commuter Rail Line. Trains leaving Boston for Newburyport and Rockport serve all stations on the ERML between North Station and Beverly Depot, at which point they separate and travel onto their respective destinations. The existing commuter rail system in the North Shore Transit Improvements Project-MIS study area is depicted in Figure 2-7. Each commuter rail train set on the North Shore consists of one locomotive and up to seven coaches. Coaches currently used on the North Shore services are primarily single-level coaches capable of seating 125 passengers.

2.4.1 Haverhill Line

The Haverhill commuter rail line operates from North Station in Boston to Haverhill, MA. The line includes 13 station stops over its approximately 33 miles of track. The southern portion of the route, approximately eight miles in length, traverses the western portion of the North Shore Transit Improvements Project-Major Investment Study (MIS) area in the towns of Malden and Melrose. Within these two study area communities there are four commuter rail stations: Malden Center, Wyoming Hill, Melrose/Cedar Park, and Melrose Highlands. The Malden Center station provides service to the commuter rail.



MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 2-7
Commuter Rail Stations

Parsons Brinckerhoff

DMJM HARRIS

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2.4.2 Weekday Service

There are 23 revenue train trips per day provided on the Haverhill line during weekday inbound and outbound service.[4] Service at the stations varies depending on the station location. In general, the stations between Reading and North Station have more frequent service than outlying stations ("short turned"), because several trains operate only between Reading and North Station. Tables 2-6 and 2-7 provide details on the number of trains providing service to each station on the line. Due to their relative proximity to North Station, the four stations in the North Shore study area are served by a large number of trains in comparison to stations located beyond Reading. The scheduled travel time from Haverhill to North Station ranges between 59 and 70 minutes. Scheduled travel time between Melrose Highlands and North Station varies between 15 and 20 minutes during weekday service.

Table 2-6 Haverhill Line Weekday Inbound Train Service by Station

Trains Serving Station	**Number of Weekday Trains Inbound to North Station**				
Arriving/Departing Station:	**5AM-9:30 AM**	**9:30 AM-4PM**	**4PM-7 PM**	**After 7 PM**	**Total No. of Trains**
Haverhill	6	3	2	2	13
Bradford	6	3	2	2	13
Lawrence	6	3	2	2	13
Andover	6	4	2	2	14
Ballardvale	6	4	2	2	14
North Wilmington	5	4	0	2	11
Reading	7	6	3	4	20
Wakefield	7	6	3	4	20
Greenwood	7	6	1	4	18
Melrose Highlands	7	6	3	4	20
Melrose / Cedar Park	6	7	2	4	19
Wyoming Hill	6	7	1	4	18
Malden Center	6	7	3	4	20
North Station	7	7	5	4	23

Source: Massachusetts Bay Transportation Authority, 2004.

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[4] Based on January 3, 2004 MBTA operating schedule.

Table 2-7 Haverhill Line Outbound Weekday Service

Trains Serving Station	Number of Weekday Trains Outbound to Haverhill				
Arriving/Departing Station:	**5AM-9:30 AM**	**9:30 AM-4PM**	**4PM-7 PM**	**After 7 PM**	**Total No. of Trains**
North Station	5	6	6	6	23
Malden Center	4	5	7	5	21
Wyoming Hill	3	5	5	5	18
Melrose / Cedar Park	3	6	6	5	20
Melrose Highlands	3	6	6	5	20
Greenwood	1	6	5	5	17
Wakefield	3	6	7	5	21
Reading	3	6	7	5	21
North Wilmington	0	5	4	3	12
Ballardvale	1	5	4	4	14
Andover	1	5	3	5	14
Lawrence	1	4	3	5	13
Bradford	1	3	4	5	13
Haverhill	1	3	4	5	13

Source: Massachusetts Bay Transportation Authority, 2004.

2.4.3 Weekend Service

Service on the Haverhill commuter rail line during the weekend consists of six inbound trips and six outbound trips per day (both Saturday and Sunday). Service is provided to every station on the line at a three-hour service frequency. Inbound trains originate in Haverhill at 7:15 AM, 10:15 AM, 1:15 PM, 4:15 PM, 7:15 PM and 10:15 PM. Outbound trains originate at North Station at 8:45 AM, 11:45 AM, 2:45 PM, 5:45 PM, 8:45 PM and 11:30PM. Scheduled travel time from Haverhill to North Station during weekends is 64 minutes. From Melrose Highlands to North Station, the scheduled travel time is approximately 17 minutes.

2.4.4 Rockport/Newburyport Line

The ERML north of Boston extends from North Station to Newburyport, providing commuter rail service to eleven stops (including North Station)[5]. The Rockport Branch diverges from the main line north of Beverly station, and provides service to seven additional stations: (Montserrat, Prides Crossing, Beverly Farms, Manchester, West Gloucester, Gloucester, and Rockport). Train sets are stored overnight at "layover facilities" located at the Newburyport and Rockport termini. Present services require overnight storage of four train sets at each location.

2.4.5 Weekday Service

Service is provided seven days a week. However, the most frequent service is provided during weekday peak periods, with an emphasis on serving commuters traveling to work in downtown Boston. The scheduled travel time between Newburyport and North Station for weekday service varies between 59 minutes and 68 minutes. For weekday service to Rockport, the scheduled travel time varies between 68 and 74 minutes. Tables 2-8 and 2-9 provide details on the number of trains providing service to each station on the line.

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[5] Not including the River Works (Lynn) stop for General Electric employees.

Table 2-8 Newburyport/Rockport Line Weekday Inbound Train Service by Station

Trains Serving Station	**Number of Weekday Trains Inbound to Boston North Station**				
Arriving/Departing Station:	**5AM-9:30 AM**	**9:30 AM-4PM**	**4PM-7 PM**	**After 7 PM**	**Total No. of Trains**
Rockport Branch	-	-	-	-	-
Rockport	5	4	2	2	13
Gloucester	5	3	3	2	13
West Gloucester	5	3	2	2	12
Manchester	5	3	2	3	13
Beverly Farms	4	4	2	2	12
Prides Crossing	3	0	0	0	3
Montserrat	4	4	2	2	10
Newburyport Branch	-	-	-	-	-
Newburyport	5	4	2	2	13
Rowley	5	4	2	2	13
Ipswich	5	4	2	2	13
Hamilton / Wenham	6	4	2	2	14
North Beverly	6	4	2	2	18
Beverly Depot	12	8	7	4	31
Salem	12	8	6	4	30
Swampscott	10	8	4	3	25
Lynn	10	8	4	3	25
Riverworks	7	2	4	2	15
Chelsea	7	9	4	4	24
North Station	11	9	6	4	30

Source: Massachusetts Bay Transportation Authority, 2004.

Table 2-9 Newburyport / Rockport Line: Weekday Outbound Train Service by Station

Trains Serving Station	**Number of Weekday Trains Outbound to Rockport/Newburyport**				
Arriving/Departing Station:	**5AM-9:30 AM**	**9:30 AM-4PM**	**4PM-7 PM**	**After 7 PM**	**Total**
North Station	7	9	9	5	30
Chelsea	5	8	8	4	25
Riverworks	4	2	4	2	12
Lynn	4	8	7	6	25
Swampscott	4	8	7	6	25
Salem	7	8	9	7	31
Beverly Depot	6	7	10	8	31
Newburyport Branch	-	-	-	-	-
North Beverly	2	4	3	4	13
Hamilton / Wenham	2	4	3	4	13
Ipswich	2	3	4	4	13
Rowley	2	3	4	4	13
Newburyport	2	3	4	4	13
Rockport Branch	-	-	-	-	-
Montserrat	2	3	4	4	13
Pride’s Crossing	0	1	3	1	5
Beverly Farms	2	3	4	4	13
Manchester	2	3	3	5	13
West Gloucester	2	3	3	5	13
Gloucester	2	3	3	5	13
Rockport	1	4	3	5	13

Source: Massachusetts Bay Transportation Authority, 2004.

2.4.6 Weekend Service

Weekend service on the Rockport/Newburyport Commuter Rail line is provided with 26 train trips per day (13 inbound and 13 outbound trips). Fourteen of the trips (seven inbound / seven outbound) are provided on the Rockport Branch. The other 12 trips (six inbound/six outbound) are provided to Newburyport. Outbound trains depart North Station approximately every hour throughout the day with some two hour headways (8:30 AM to 11:30 PM) and alternate between Newburyport and Rockport destinations. Inbound trains depart from Rockport and Newburyport, approximately every two hours throughout the day. Scheduled travel times for the weekend service to and from Rockport varies between 66 and 69 minutes. To and from Newburyport, the scheduled travel times vary between 61 and 62 minutes.

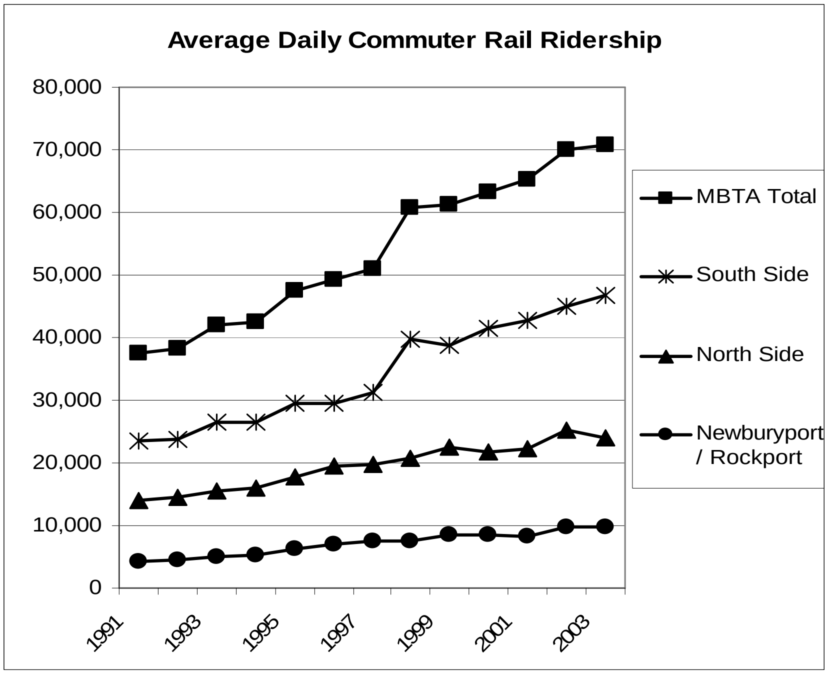
2.5 MBTA Commuter Rail Characteristics

2.5.1 Commuter Rail Ridership

Commuter rail ridership on the MBTA system has grown significantly in the past decade. This is due to numerous factors including several system expansions (notably the Newburyport, Old Colony, and Worcester service extensions), additional vehicles, and improving employment and economic conditions in downtown Boston. Figures 2-8 and 2-10 depict historic trends in commuter rail ridership.

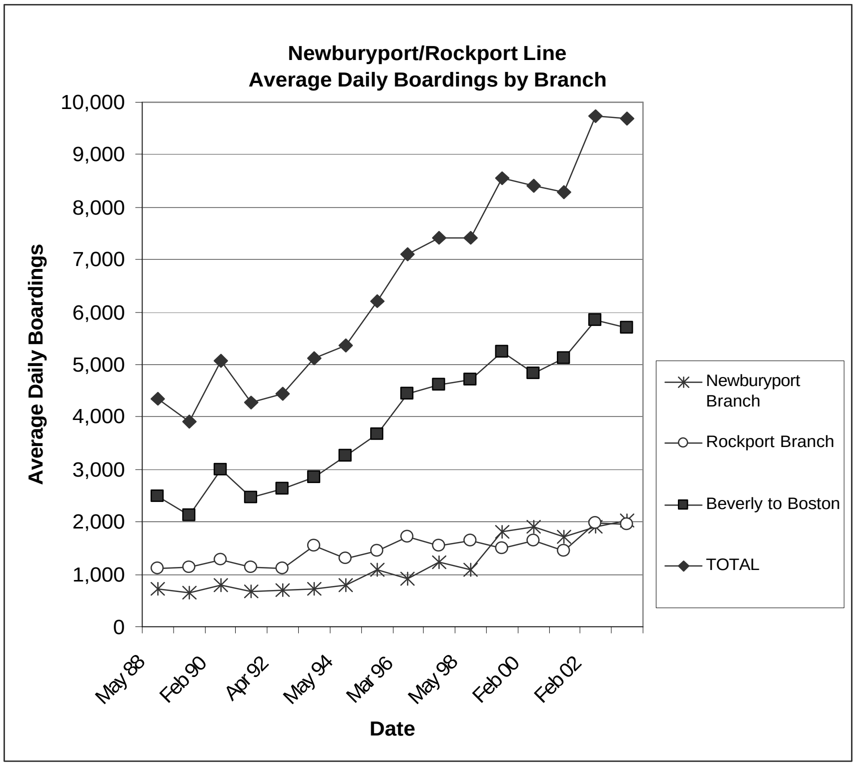
The MBTA conducts counts of inbound passenger boardings by station approximately three times per year. The data for year 2000 has been averaged to determine the approximate number of boardings that occurred on a typical weekday. Tables 2-10 and 2-11 depict this data for the Newburyport/Rockport Line and the Haverhill Line.

Figure 2-8 Average Daily Commuter Rail Ridership



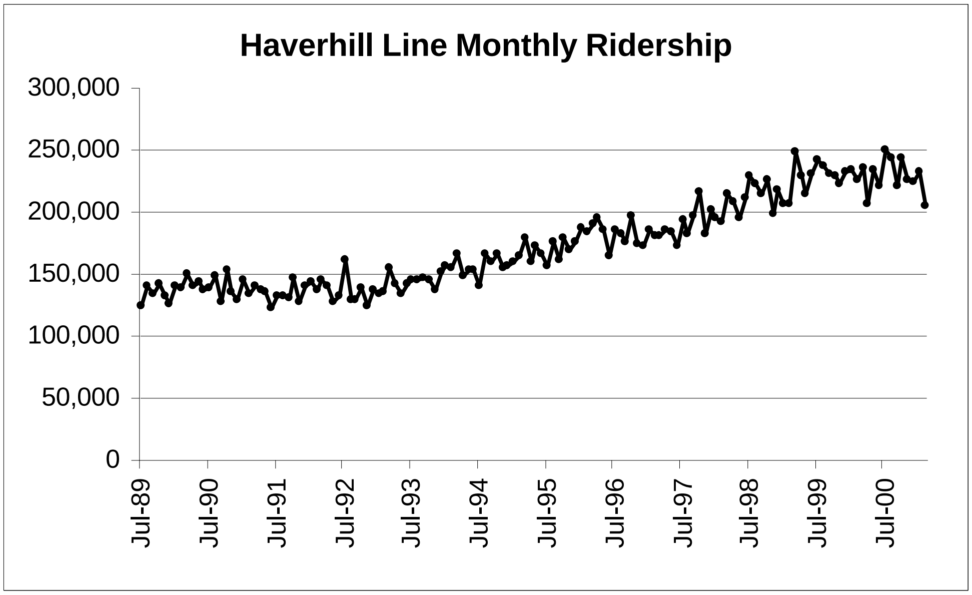
Source: Central Transportation Planning Staff, 2004.

Figure 2-9 Average Daily Ridership for Rockport/Newburyport Line



Source: Central Transportation Planning Staff, 2004.

Figure 2-10 Monthly Average Ridership for Haverhill Commuter Rail Line



Source: Massachusetts Bay Transportation Authority, 2001.

The MBTA conducts counts of inbound passenger boardings by station approximately three times per year. The latest data available are counts conducted in November 2003. These counts represent the most current typical weekday ridership. Table 2-10 depicts this data for the Newburyport/Rockport Line.

Table 2-10 Newburyport/Rockport Typical Weekday Inbound Boardings

Station/Branch	**Average Weekday Inbound Boardings (2003)**
Rockport Branch	-
Rockport	345
Gloucester	471
West Gloucester	93
Manchester	372
Beverly Farms	189
Prides Crossing	30
Montserrat	342
Newburyport Branch	-
Newburyport	744
Rowley	105
Ipswich	420
Hamilton / Wenham	455
North Beverly	472
Beverly Depot	1,970
Salem	2,398
Swampscott	957
Lynn	773
Riverworks	29
Chelsea	210

Source: Massachusetts Bay Transportation Authority, November 2003.

Table 2-11: Haverhill Line Average Daily Boardings by Station (2000)

Station	***Average Weekday Inbound Boardings (2000)***
Haverhill	337
Bradford	433
Lawrence	462
Andover	601
Ballardvale	265
North Wilmington	130
Reading	755
Wakefield	629
Greenwood	131
Melrose Highlands	342
Melrose / Cedar Park	258
Wyoming Hill	176
Malden Center	47

Source: Massachusetts Bay Transportation Authority, 2001.

2.5.2 Fare Structure

The fare structure for commuter rail service is based on a zone system. Fares increase with distance traveled. Table 2-12 summarizes the adult regular one-way fares from North Station to station locations on the North Shore. This table reflects the new fare and zone structure that was instituted on January 3, 2004.

Table 2-12 One-way Regular Commuter Rail Fares from North Station

Station(s)	One-Way Adult Regular Fare [6]
Chelsea	$2.00
Riverside, Lynn	$3.50
Salem, Swampscott	$3.75
Montserrat, Beverly Depot	$4.50
Beverly Farms, Prides Crossing, Hamilton/Wenham, North Beverly	$5.00
Ipswich, Manchester	$5.25
Gloucester, West Gloucester	$5.50
Rockport, Newburyport	$6.00

Source: Massachusetts Bay Transportation Authority, 2004.

2.6 Rail Rapid Transit Service

One of the MBTA's four rail transit lines, the Blue Line, is located within the North Shore study area (Figure 2-11). The Blue Line is connected in downtown Boston at the State Street Station located in the financial district. Transfers to other rapid transit (Red and Green Lines) are available at other stations such as Downtown Crossing and Government Center.

2.6.1 Blue Line

The Blue Line is approximately six miles long, and operates from Bowdoin Station in Boston to Wonderland Station in Revere. There are twelve stations located along the Blue Line (all within the study area):

- Bowdoin
- Government Center
- State
- Aquarium
- Maverick
- Airport
- Wood Island
- Orient Heights
- Suffolk Downs
- Beachmont
- Revere Beach and,
- Wonderland.

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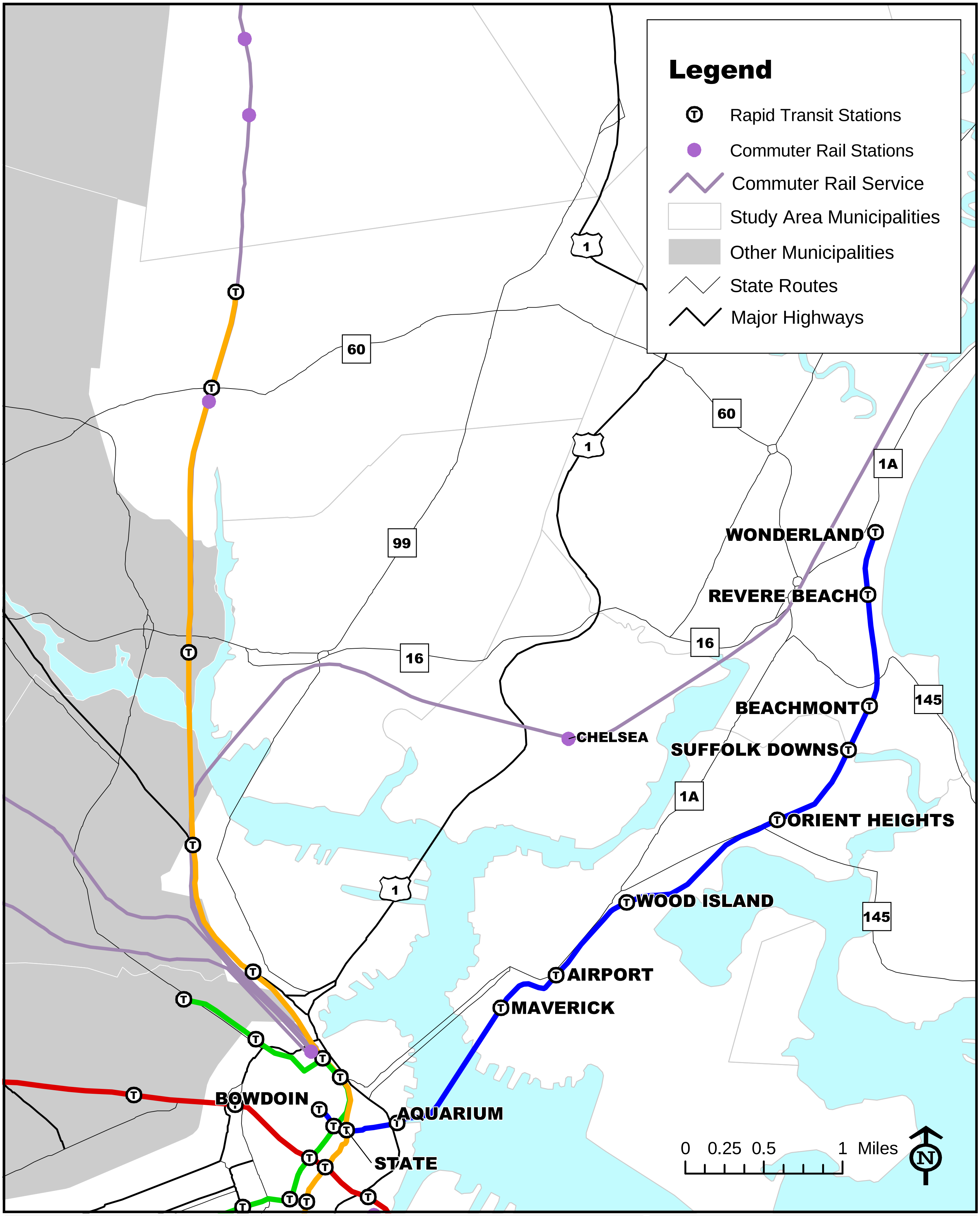
[6] A $1.00 surcharge during off-peak period is added to tickets purchased on board when a ticket counter is open at the boarding station. The surcharge is $2.00 during peak-period travel times.



MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 2-11
Rapid Transit Stations

Parsons Brinckerhoff 100 YEARS

DMJM HARRIS

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The present day Blue Line emerged as a rapid transit line in the 1920's, when the streetcar subway route between Bowdoin and Maverick stations was converted to rapid transit rail service. North of Maverick Station, the streetcar service continued to operate to Lynn. The Boston, Revere Beach and Lynn Railroad (BRB&L), was an at-grade narrow gauge railroad line that operated between East Boston and Lynn until 1940. In the 1950s, the ROW of the BRB&L line up to Wonderland Revere, was rebuilt for standard rail transit operation. This extension created the Blue Line route and twelve station locations as they exist today. North of Airport Station, all of the stations were rebuilt in the 1990s except for the Orient Heights station. The new stations provide accessibility for disabled patrons.

The Blue Line currently operates with four-car trains at all times. This is primarily due to the short platforms at several Blue Line stations. Through the Blue Line Modernization Project, Aquarium Station has been renovated and expanded to accommodate future six-car trains. Work also will be performed at the Orient Heights, Government Center, State, and Maverick stations to accommodate future six-car trains.

The current fleet of Blue Line cars consists of 70 vehicles that were built between 1979 and 1980. The cars are 48-feet long, significantly shorter than Red Line cars, and accommodate 42 seated passengers. The MBTA has placed an order for 94 new cars to replace the current fleet, and accommodate the future operation of six-car trains on the Blue Line. The operation of six-car trains will increase the line's peak passenger carrying capacity by 50%. Other improvements such as automated in-car station stop announcing and displays are also planned for the new Blue Line vehicles.

The Blue Line operates daily with service frequencies as listed in Table 2-13. Peak period travel time from Government Center to Wonderland (the terminus of the line) is approximately 23 minutes. The average daily boardings for a typical weekday by station are presented in Table 2-14.

Table 2-13 Blue Line Service Frequencies

Weekday Peak Hours	Weekdays Off Peak	Weekday Nights	Saturday	Sunday
4 minutes	10 minutes	11 minutes	9 to 11 minutes	9 to 14 minutes

Source: Massachusetts Bay Transportation Authority, 2004.

Table 2-14 Blue Line Average Weekday Ridership by Station

Station	Average Daily Weekday Boardings[7]
Bowdoin	1,491
Government Center	12,167
State	12,856
Aquarium	2,793
Maverick	8,409
Airport	4,229
Wood Island	2,144
Orient Heights	3,596
Suffolk Downs	941
Beachmont	2,120
Revere Beach	2,002
Wonderland	5,426
Total	**57,388**

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[7] Source: CTPS 1997 Rapid Transit Passenger Counts.

Source: Central Transportation Planning Staff, 2001.

2.6.2 Fare Structure

A regular fare on the MBTA rapid transit system is $1.25 per trip, which reflects the new fare and zone structure that was instituted on January 3, 2004. Transfers between rapid transit lines (Blue, Orange, Green and Red) are free. Monthly passes are available for $44. Combination passes and visitor passes are also available for subway patrons.

2.7 Bus System

2.7.1 MBTA Routes

The MBTA bus system provides approximately 376,000 daily bus boardings system-wide, more boardings than any other MBTA rapid transit mode. There are approximately 170 individual bus routes, covering 730 route miles in the MBTA service area. This includes approximately 8,600 bus stops throughout the system.

MBTA buses provide significant service to North Shore study area communities. These buses provide local route service, feeder routes to commuter rail and rail rapid transit stations, and express bus routes to Boston. Approximately 45 bus routes serve the study area communities. Table 2-15 identifies each North Shore route and its associated service frequency for peak periods, daytime, nighttime, Saturday, and Sunday service. Table 2-16 identifies the average weekday ridership (boardings) per bus route operated by the MBTA.

Vehicles

As of 2003, there were 996 buses in operation on MBTA direct service bus routes. MBTA bus service in the study area is based at the Lynn garage on Western Avenue; Fellsway garage on Salem Street in Medford; and the Charlestown garage on Arlington Avenue. As of March 31, 2001, the active bus fleet based at Lynn was 106 buses. Sixty-three buses are based at Fellsway, and 236 buses are based at Charlestown. These vehicles are 40-foot buses with a seated capacity ranging from 36 to 40 passengers.

Fare Structure

A regular fare for local bus service is 90 cents per trip. Children, students, senior citizens, and persons with disabilities pay a reduced charge or no fare. Monthly passes are available for unlimited use on all MBTA local bus routes and select other routes (such as the Cross Town routes) for the monthly regular fare of $31.

Fares for express bus routes serving the North Shore are higher than the local bus routes. Boston-bound express trips from Revere, Saugus and East Boston cost $2.20 per trip. Routes from Lynn are $3.10 per trip. Routes from Salem, Swampscott, Marblehead, Peabody, and Nahant cost $3.45 per trip.

Table 2-15 North Shore Bus Routes: Service Frequencies

Rte	Origin/Destination	Service Frequency (Minutes)				
		Peak	Day	Night	Sat	Sun
97	Malden – Wellington	30	60	-	50	-
99	Boston Regional Medical Center – Wellington	20	30	60	30	60
101	Malden Center – Sullivan	10	30	60	30	60
104	Malden Station – Sullivan	15	30	60	30	60
105	Malden Station – Sullivan	30	60	-	60	60
106	Lebanon St – Malden / Wellington	20	30	60	30	60
108	Linden Square – Wellington	20	30	60	30	60
109	Linden Square – Sullivan Square	15	30	60	30	60
110	Wonderland or Broadway–Park/Wellington	16	30	60	30	60
111	Woodlawn – Haymarket	7	15	15	12	15
112	Wellington Station / Wood Island Station-	30	35	-	35	45
114	Bellingham Sq. – Maverick Station	10	40	-	-	-
116	Wonderland – Maverick	20	30	60	30	60
117	Wonderland – Maverick	20	30	60	30	60
119	Northgate – Beachmont	30	60	40	60	60
130	Lebanon Street – Malden Station	45	90	-	90	-
131	Melrose Highlands – Malden Station	30	60	-	-	-
132	Redstone Shopping Center – Malden Station	45	90	-	90	-
136	Reading Depot – Malden Station	45	70	-	60	-
137	Reading Depot – Malden Station	60	70	75	60	-
411	Malden Station – Revere Jack Satter House	50	60	-	60	-
424	Eastern Ave. & Essex St.-Haymarket or Wonderland	30	-	-	-	-
425	Lynn – Saugus – Wonderland Station	L[8]	-	-	-	-
426	Lynn & East Saugus – Haymarket Express	15	60	85	60	60
428	Oaklandvale – Haymarket Station	L	-	-	-	-
429	Central Square – Lynn – Linden Square	30	60	75	60	90
430	Appleton Street, Saugus – Malden Station	40	60	85	60	-
431	Neptune Towers – Central Square, Lynn	60	90	-	60	60
435	Liberty Tree Mall – Central Square, Lynn	60	60	60	60	120
436	Centennial Park – Central Square, Lynn	30	70	-	60	120
439	Central Square, Lynn – Nahant	30	L	-	-	-
441	Marblehead – Haymarket	30	60	-	60	120
442	Marblehead – Haymarket	30	60	-	60	120
448	Marblehead – Downtown Crossing	60	-	-	-	-
449	Marblehead – Downtown Crossing	60	-	-	-	-
450	Salem – Haymarket	15	60	75	60	60
451	North Beverly – Salem	60	60	-	-	-
455	Salem Depot – Haymarket	60	30	60	30	60
456	Salem Deport – Central Square, Lynn	60	60	60	-	-
459	Salem – Downtown Crossing	60	60	-	-	-
465	Liberty Tree Mall – Salem Depot	60	60	-	60	-
468	Salem Depot – Danvers	40	60	-	-	-

Source: Massachusetts Bay Transportation Authority, 2004.

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[8] "L" indicates Limited Service is provided on this route

Table 2-16 North Shore Bus Routes: Average Weekday Ridership

Rte	**Origin/Destination**	**Daily Ridership** [9]
97	Malden – Wellington	535
99	Boston Regional Medical Center – Wellington	1,681
101	Malden Center – Sullivan	4,323
104	Malden Station – Sullivan	3,360
105	Malden Station – Sullivan	893
106	Lebanon St – Malden / Wellington	2,504
108	Linden Square – Wellington	2,708
110	Wonderland or Broadway – Park/Wellington	2,513
111	Woodlawn – Haymarket	8,107
112	Wellington Station / Wood Island Station	1,338
114	Bellingham Sq. – Maverick Station	1,218
116	Wonderland – Maverick	4,680
117	Wonderland – Maverick	4,289
119	Northgate – Beachmont	1,072
130	Lebanon Street – Malden Station	144
131	Melrose Highlands – Malden Station	476
132	Redstone Shopping Center – Malden Station	504
136	Reading Depot – Malden Station	949
137	Reading Depot – Malden Station	966
411	Malden Station – Revere Jack Satter House	816
424	Eastern Ave. & Essex St. –Haymarket or Wonderland	N/A[10]
425	Lynn – Saugus – Wonderland Station	179
426	Lynn & East Saugus – Haymarket Express	1,389
428	Oaklandvale – Haymarket Station	101
429	Central Square – Lynn – Linden Square	917
430	Appleton Street, Saugus – Malden Station	820
431	Neptune Towers – Central Square, Lynn	N/A
435	Liberty Tree Mall – Central Square, Lynn	897
436	Centennial Park – Central Square, Lynn	505
439	Central Square, Lynn – Nahant	175
441	Marblehead – Haymarket	1,240
442	Marblehead – Haymarket	1,354
448	Marblehead – Downtown Crossing	156
449	Marblehead – Downtown Crossing	218
450	Salem – Haymarket	1,839
451	North Beverly – Salem	333
455	Salem Depot – Haymarket	1,898
456	Salem Deport – Central Square, Lynn	N/A
459	Salem – Downtown Crossing	1,131
465	Liberty Tree Mall – Salem Deport	N/A
468	Salem Depot – Danvers	39

Source: Central Transportation Planning Staff, 2004.

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[9] Source: MBTA Comprehensive Ridecheck Program:

[10] Counts have not been conducted on the service routes initiated since 2001.

2.7.2 Non-MBTA North Shore Bus Service

In addition to the bus routes paid for and operated by MBTA equipment, other public transportation providers operate some bus routes in the North Shore.

Route 712 & 713

Paul Revere Transportation Company operates Bus Routes 712 and 713 (Point Shirley – Orient Heights via Winthrop Highlands). The fare for this service is 75 cents. MBTA passes are not accepted on the routes.

Cape Ann Transit Authority

The Cape Ann Transit Authority (CATA) operates 10 bus routes six days per week in Gloucester and Rockport. Service frequencies vary from 30 minutes on the Gloucester Business Express route to over two hours on other routes. An additional route provides service on Saturdays between downtown Gloucester and two area shopping centers. On Sundays in the summer, a tourist-oriented trolley bus operates on a loop around Gloucester and Rockport. Fares for the system range from $1.00 to $1.25 for local routes. The mall route costs $3.00 one-way or $5.00 round-trip.

Beverly Shoppers Shuttle

Other local bus service is jointly subsidized by the MBTA and participating towns, the towns contract out for the service. In Beverly, a “Shopper Shuttle” operates Monday through Saturday as a loop route throughout Beverly. The service is provided by CATA using their vehicles, however the City of Beverly jointly subsidizes the service with the MBTA Lynn East/West Loop Routes

In Lynn, Laidlaw Transportation operates a local circulator bus throughout the city. The route operates six days per week (Monday through Saturday) from 9:30 AM to 5:50 PM. Average ridership along the route is 35 – 50 passengers per day. The fare is 25 cents. The route is subsidized by both the City of Lynn and the MBTA.

Coach Company Express Bus

Some express bus service is provided via inter-district subsidies to private transportation companies. The Coach Company operates eleven round trip express bus trips per day, providing service between six study area communities and five downtown Boston stops[11]. Two round trips per day are operated on Coach Company’s Haverhill service via Georgetown, Boxford, Topsfield, and Lynnfield. Eight morning inbound trips per day are provided on Coach Company’s Hampton, NH service from Newburyport into Boston. Additionally, three morning inbound trips provide service from Peabody to Boston (one of these trips originates in Peabody). In the afternoon, six outbound trips provide service to Peabody, and nine outbound trips provide service to Newburyport. Four of the eleven morning inbound trips make stops at Boston’s Logan Airport. Table 2-17 depicts the fares charged for Coach Company express bus routes. Table 2-18 depicts recent ridership figures for these routes. Table 2-19 depicts the town of origin of the passengers on these trips.

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[11] Haymarket Square, Government Center, Park Street, St. James Ave., Copley Square

Table 2-17 Coach Company Fares for North Shore Commutes to Boston

Location	One Way	10-Ride	20-Ride	Airport
Newburyport	$8.75	$59.00	$110.25	$15.00
Georgetown	$7.50	$57.25	$104.25	$15.00
Boxford	$7.25	$54.00	$98.50	$15.00
Topsfield	$7.00	$54.00	$98.50	$15.00
Peabody	$6.75	$52.00	$93.50	$15.00
Lynnfield	$6.50	$49.75	$88.50	$15.00

Source: Coach Company, 2004.

Table 2-18 Subsidized Express Bus Route Weekday Ridership

Company	Origin	Destination	Ridership
Coach Company	Newburyport Service	Boston	221
Coach Company	Haverhill Service	Boston	70

Source: CTPS November, 2000 Ridership Survey

Table 2-19 Place of Residence of Coach Company Express Bus Route Patrons

Town of Origin	# Of Passengers	Percent of Respondents
Newburyport	71	29%
Boxford	20	8%
Georgetown	14	6%
Topsfield	12	5%
Salisbury	11	5%
West Newbury	11	5%
Peabody	10	4%
Danvers	4	2%
Newbury	4	2%
Rowley	3	1%
Ipswich	1	0.5%
Salem	1	0.5%
Other (NH, ME, other MA)	79	32%

Source: CTPS November, 2000 Ridership Survey

2.7.3 Inter-city Bus Service

Private transportation companies also provide some service on the North Shore without the assistance of public funding or subsidies. C&J Trailways operates intercity bus service from Newburyport to Boston's South Station and to Logan Airport. For service to South Station, there are 17 trips provided on weekdays, and ten trips provided on Saturdays, Sundays and holidays. The scheduled travel times vary from 45 minutes to 70 minutes, depending on the time of day. Regular fare is $9.50 one-way from Newburyport and $17 roundtrip. Same day commuter fare (round trip) is $15.00. Ten-ride commuter tickets are also available for use within a 21-day ($62) period.

For service to Logan Airport, there are 16 trips provided everyday, however two of the evening trips are via Boston's South Station. Scheduled travel times to Logan Airport from Newburyport vary from 45 minutes to 60 minutes. The two evening trips via South Station have a scheduled trip length of 70 minutes. The regular adult fare for one-way trips to Logan is $17. Round trip fare is $30. A same day round trip fare is $19. As with service to South Station, a ten-ride commuter ticket is available, however these tickets are only available to airport employees with employer identification. These ten-ride tickets are $62 for the 21-day period, $68 for a 35-day period, $75 for a 45-day period.

2.7.4 Airport Access: Logan Express

Massport operates a system of four regional park and ride lots to provide motor coach service to and from Logan International Airport. In 2000, 1.1 million passengers used the system to access Logan. Regular system-wide adult fares from the Logan Express lots to Logan are $11 one-way, $20 roundtrip. The parking rate is $11 per day; however seven day parking is available at a six-day rate ($66). Service to Logan is provided seven days per week, with 30-minute service frequencies on weekdays, and 30 or 60 minutes on weekends.

The Logan Express facility located in Peabody is the newest Logan Airport remote parking facility, which was opened in the fall of 2001. The site is located at 146 Newbury Street, within easy access of Route 1 and Interstate 95. The Peabody location includes parking spaces for 200 cars, with eventual plans to expand to 700 spaces. It is estimated that the facility eliminates 200,000 car trips per year to and from Logan International Airport.

Logan Airport Passenger Access Survey [12]

The Massachusetts Port Authority has conducted surveys of enplaning passengers at Logan International Airport periodically since 1979. The surveys are used by Massport to review data related to passenger characteristics, type of travel, travel mode for accessing the airport, and traveler place of origin. The most recent survey was taken in May 1999. Major findings from the survey are listed below. Complete results are available in the 1999 Air Passenger Survey Final Report, released by Massport in January 2000. Due to the size of the sample, specific findings related to North Shore airport travelers may not be extracted from the data set with the same statistical accuracy as the findings reported below for the general population of Logan Airport travelers. The surveys classified each traveler into one of four possible travel “markets”: resident business, resident non-business, non-resident business, and non-resident non-business.

- The use of high-occupancy vehicles (HOVs) did not change significantly between 1996 and 1999. Among the 30 percent of passengers who arrived in HOV modes in 1999, the most popular services were door-to-door limousine (9%), MBTA (8%), and Logan Express (5%).

- In 1999, almost 37 percent of passengers arrived in private cars. This was statistically equivalent to the 1996 auto share.

- The resident, non-business traveler market had the highest HOV share, at 38 percent. The resident and non-resident business markets had the lowest, at 26 percent each.

- Use of HOV modes was greater in localities outside Route 128 than in communities closer to the airport. About 33 percent of all passengers with trips originating outside Route 128 chose HOV modes, compared with 27 percent of those inside the Route 128 corridor.

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[12] Source: Massport: 1999 Logan International Airport Air Passenger Survey Final Report (January 2000)

- Despite a high overall HOV share, 49 percent of passengers with local origins outside Route 128 used private cars for ground access. In contrast, the taxicab was the mode of choice for those with local origins within Route 128, at 36 percent.

2.8 Highway Network

2.8.1 Interstates & Principal Highways

Major highways in the study area include Interstate 95, Route 128, and Route 1. In general, during the morning and evening peak periods, these roadways experience heavy congestions and mobility problems along some segments, within the study area. These areas of congestion are more dense as the roadways approach downtown Boston.

In 1999 and 2000, the Central Transportation Planning staff (CTPS) conducted a speed and travel time study on limited-access highways in the Boston metropolitan region, including Interstate 95 and Route 1. Tables 2-20 through 2-23 are some of the results of that study as they relate to this project:

Route 1

Table 2-20 Southbound A.M. Peak Period

Segment		Segment Length (Miles)	Average Speed (MPH)	Average Travel Time (Min:Sec)	Level Of Service[12]
From	**To**				
Lowell St. Off-Ramp	I-95 On-Ramp	.52	45	0:42	F
I-95 On-Ramp	Traffic Signal	.87	35	1:34	F
Traffic Signal	Rte.129 On-Ramp	1.33	47	1:45	F
Lynn St. On-/Off Ramp	Rte.60 Off-Ramp	.26	52	0:18	F
Rte.60 Off-Ramp	Sargent St. On-Ramp	1.14	60	1:09	E
Everett Ave. On-Ramp	Tobin Bridge Toll Booths	.48	34	0:54	F
Tobin Bridge Tolls Booths	I-93 NB Off-Ramp	.78	20	2:50	F
I-93 NB Off-Ramp	I-93/Rte. 1 Merge	.67	7	7:05	F

Table 2-21 Northbound P.M. Peak Period

Segment		Segment Length (Miles)	Average Speed (MPH)	Average Travel Time (Min:Sec)	Level of Service[13]
From	**To**				
I-93/Rte.1 Split	City Square On-Ramp	.56	32	1:03	F
Sargent St. Off-Ramp	Rte. 60 On-Ramp	1.25	60	1:15	E
Rte. 60 On-Ramp	Lynn St. Off-Ramp	.32	27	0:43	F
Lynn St. Off-Ramp	Rt. 99 On-Ramp	1.38	44	1:52	F
Rt. 129 On-Ramp	U-Turn Entrance	.93	39	1:26	F
U-Turn Entrance	Rte. 128 On-Ramp	.15	40	0.14	F
Rte. 128 On-Ramp	I-95 North Off-Ramp	.77	51	0:54	F
I-95 North Off-Ramp	Lowell St. Off-Ramp	.47	57	0:30	D

Route 128

Table 2-22 Southbound A.M. Peak Period

Segment		Segment Length (Miles)	Average Speed (MPH)	Average Travel Time (Min:Sec)	Level of Service
From	**To**				
Rte.22 On-Ramp, Beverly	Exit 19 Brimbal Ave.	1.05	60	0:39	E
Exit 19 Brimbal Ave.	Exit 20A Rte. 1A, Hamilton	.65	60	1:10	E
Exit 22 Rte. 62, Danvers	Exit 23 Rte. 35, Danvers	.64	58	0:40	E
Exit 23 Rte. 35	Exit 24 Endicott St.	.71	56	0:46	E
Exit 28 Forest St.	Exit 29 I-95 North	.55	61	0:33	D
Exit 29 I-95 North	Exit 44 Rte. 1 South	1.13	59	1:09	E
Exit 44 Rte. 1 South	Exit 43 Lynnfield Ctr.	1.96	58	2:01	E

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[13] Level of service is a traffic congestion indicator. Level of service A is the best rating, indicating generally free-flowing, unrestricted movement. Level of Service F indicates heavy congestion and unacceptable delay conditions.

Table 2-23 Northbound P.M. Peak Period

Segment		Segment Length (Miles)	Average Speed (MPH)	Average Travel Time (Min:Sec)	Level of Service
From	To				
Exit 41, Lynnfield	Exit 42 Salem St.	1.32	60	1:19	E
Exit 42 Salem St.	Exit 43, Lynnfield	.72	60	0:43	E
Exit 45 I-95 North	Exit 28 Forest St.	.62	37	1:01	F
Exit 28 Forest St.	Exit 26, Peabody	1.10	46	1:26	F
Exit 26, Peabody	Exit 25A, Salem	.70	48	0:53	F
Exit 20B, Beverly	Exit 19 Brimbal Ave.	.68	54	0:46	E
Exit 19 Brimbal Ave.	Exit 18 Rte. 22, Essex	1.13	54	1:15	E

2.8.2 Arterial System

There are several arterials in the study area including Route 1A, Route 60, Route 97, Route 99, Route 107, Route 114, Route 129, and Route 133. Similar to the Interstate and principal highways these roadways experience congestion, long delays and unacceptable levels of service along some segments during the peak periods. Included in the CTPS study is Route 1A/Route 60. Tables 2-24 and 2-25 are the results for several segments along these roadways:

Route 1A/Route 60

Table 2-24 Southbound A.M. Peak Period

Segment		Segment Length (Miles)	Average Speed (MPH)	Average Travel Time (Min:Sec)	Level of Service
From	To				
Rte 60 Off-Ramp from Rte. 1 SB	Northgate Mall Traffic Signal	.62	30	1:14	B
Northgate Mall Traffic Signal	Brown Circle Entry	.58	33	1:03	B
Brown Circle Entry	Revere St. traffic Signal	.47	24	1:09	C
U-Turn traffic Signal	Boardman St. Signal	.34	17	1:11	D
Boardman St. Signal	Bennington St. On-Ramp	1.11	49	1:22	A
Logan Airport On-Ramp	Sumner Tunnel Toll Booths	.37	16	1:23	E
Sumner tunnel Toll Booths	Sumner Tunnel Exit portal	1.19	15	4:47	E

Table 2-22 Northbound P.M. Peak Period

Segment		Segment Length (Miles)	Average Speed (MPH)	Average Travel Time (Min:Sec)	Level of Service
From	**To**				
Callahan Tunnel Entrance	Porter St. Off-Ramp	1.18	38	1:52	A
Curtis St. On-Ramp	Boardman St. Traffic Signal	.72	17	2:35	D
Boardman St. Traffic Signal	BP Oil Traffic Signal	.31	30	0:37	B
Bell Circle Traffic Signal	Revere St.	.50	19	1:34	D
Revere St.	Brown Circle Entry	.38	29	0:47	B
Brown Circle Entry	Northgate Mall Traffic Signal	.60	14	2:34	E
Northgate Mall Traffic Signal	Rte. 60 On-Ramp to Rte. 1 NB	.52	22	1:24	C

2.8.3 Highway Network Issues

As mentioned above, all roadways in the study area experience congestion and subsequent delays during peak traffic periods. These congestion areas can be attributed to the following factors:

- ❑ Lack of adequate capacity along roadways and intersections;
- ❑ Inability to increase capacity due to physical constraints and associated costs;
- ❑ Substantial traffic growth in the area during recent years;
- ❑ Lack of full utilization of ITS and other advanced technologies;
- ❑ Alternative driving options such as Caravan, Carpools, and Vanpools not being fully utilized by the public; and,
- ❑ Under utilization of transit system.

Chapter 3

Project Definition & Assessment

1.0 Introduction

This chapter provides assessments for each of the projects that were considered during the MIS. Section Two of this chapter details the methodology that was used to analyze each project's environmental impacts and transportation benefits.

Project assessments include the following:

- ❑ Project description;
- ❑ Capital improvements;
- ❑ Cost estimates;
- ❑ Ridership assessments (where applicable); and,
- ❑ Factors considered during project evaluation.

2.0 Methodology

2.1 Environmental Methodology

The assessment of each project in this chapter includes a summary of potential impacts in nine environmental categories: traffic, noise and vibration, air quality, wetlands, vegetation and wildlife resources, archaeological resources, historic resources, environmental justice and land use. Because these projects are being analyzed at the conceptual stage, impact evaluations are general, providing an overview of where impacts are likely to occur.

Some MIS projects are not included in this analysis, because they will be or have been analyzed separately. These projects include Rockport Station, Gloucester Station, Beverly Station and Salem Station. Some of the System Enhancement Projects discussed have minimal potential for impacts, including the Newburyport/Rockport Line Coaches, the North Shore Express Bus Route Improvements and the North Shore Bus Equipment Improvements because they primarily consist of equipment upgrades. The System Expansion Projects, however, have more potential for environmental impacts because they require new construction or the acquisition of property. The Salem-Danvers via Peabody Commuter Rail Service Project, in particular, has the greatest potential for impacts.

This section summarizes the impact methodology used in evaluating projects.

Traffic

The Central Transportation Planning Staff's (CTPS) EMME/2 Travel Forecasting Model has been used in this study to forecast traffic volumes for the future No-Build Project, in addition to the following five MIS Projects:

- ❑ Newburyport and Rockport Branch Increased Frequencies
- ❑ Revere Commuter Rail Station
- ❑ South Salem Commuter Rail Station
- ❑ Salem – Danvers via Peabody Commuter Rail Service (terminating at Endicott Street)
- ❑ Salem – Danvers via Peabody Commuter Rail Service (terminating at North Shore Mall)

The model has produced morning peak hour volumes for all above-mentioned projects along the following 16 locations:

- Route 1A Southbound, South of Revere Street - Revere
- Route 1A Southbound, North of Butler Circle - Revere
- Route 107 Southbound South of Revere Street - Revere
- Route 1 Southbound, South of Route 60 - Revere
- Canal Street Southbound, North of Ocean Street – Salem
- Canal Street Southbound, North of Loring Avenue – Salem
- Route 1A Southbound, North of Washington Street – Salem
- Route 114 Eastbound, North of Mason Street - Salem
- Route 114 Eastbound, North of Prospect Street - Peabody
- Route 128 Southbound, North of Route 114 – Peabody
- Route 128 Southbound, South of Route 114 – Peabody
- Lowell Street Eastbound, North of Route 128 – Peabody
- Endicott Street Southbound, North of Lowell Street - Peabody
- Route 35 Southbound, South of Endicott Street – Danvers
- Route 128 Southbound, North of Route 35 – Danvers
- Route 35 Southbound, North of Route 128 - Danvers

Noise and Vibration

For most projects, the potential station locations and surrounding areas were examined for potentially impacted receptors. For the Newburyport Branch and Rockport Branch Increased Frequency Project, aerial photos of the entire North Shore corridor were examined for impacts using impact distances derived from the concurrent North Shore DEIS process. Photos of potential siding and tunnel locations were also examined for potentially impacted receptors. For the Salem-Danvers via Peabody Commuter Rail Service, the Peabody-Danvers corridor was examined for potential noise and vibration impacts from a potential commuter rail line, as well as associated crossing signals, and train storage tracks.

Air Quality Analysis

The air quality assessment was conducted as a qualitative screening analysis to identify potential impacts that may necessitate further study in an Environmental Assessment/Environmental Impact Statement (EA/EIS). The primary sources of data for the screening were a description of the MIS improvements and relevant information previously compiled as part of the concurrent North Shore DEIS.

Conformity[1] with the Massachusetts State Implementation Plan (SIP) is not evaluated in the MIS. It is assumed that projects implemented as a result of this MIS will be included in the air quality conformity analysis of the Transportation Plan or Transportation Improvement Program for the region as prepared by the Boston Metropolitan Planning Organization (MPO). Thus, the MIS projects will be presumed by the regulatory agencies to conform to the SIP.

Wetlands

The review of potential impacts to regulated wetland resources for the MIS projects included a review of available information provided on the Massachusetts Geographical Information System (MassGIS) website as well as available National Wetland Inventory information (USFWS). Federal and State jurisdictional wetlands within a 200-foot wide study area were noted. Resource areas such as wetlands, the state-regulated 100-foot "buffer zone" and the 200-foot Riverfront Area and potential impacts to these resources are noted in the description of impacts.

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[1] U.S. Environmental Protection Agency, Transportation Conformity Rule, 40 CFR Part 93 Subpart A.

A wetland resource identified on GIS mapping was determined to be impacted if the wetland was crossed or shared a common boundary with the right-of-way (ROW). The number of wetland systems impacted or crossed are identified, while the linear feet of wetland adjacent to the ROW or embankment are listed for each side of the track. In addition, wetland buffer zone impacts and Riverfront Area within the study area are identified separately.

Vegetation and Wildlife Resources

Ecologically Sensitive Areas

The review of potential impacts to ecologically sensitive areas was based on a review of MassGIS data layers relating to protected areas such as ACEC's. In addition, the Open Space and Recreation lands section in the Environmental Notification Form-Restoration of Commuter Rail Service to Newburyport, Massachusetts, (MBTA, 1989), provides information on that part of the study area between Ipswich and Newbury, Massachusetts. Other sources of information included the Commonwealth of Massachusetts' Department of Fisheries and Wildlife website for locations of Wildlife Management Areas.

An identified Ecologically Sensitive Area was considered to be impacted if it abutted or crossed through an ACEC, Wildlife Management Area, or National Wildlife Refuge.

Impacts were listed as numbers of impacted communities as well as linear feet that these communities are adjacent to the ROW.

Protected Species

The review of potential impacts to protected species associated with the MIS study projects included various information sources such as MassGIS data layers relating to protected species including Priority Habitat and Estimated Habitat layers described by Massachusetts Natural Heritage and Endangered Species Program (MassNHESP). The priority habitat maps contained in the Massachusetts Natural Heritage Atlas, 2000-2001 version (MassNHESP) were also checked for consistency and additional data. These maps identify Priority Habitats of rare species protected under the Massachusetts Endangered Species Act regulations (321 CMR10).

An identified habitat was determined to be impacted if the proposed project corridor crossed or shared a common boundary with an identified Priority Habitat. An Indirect Impact was identified for any portion of the corridor occurring within 500 feet of a Priority Habitat.

Cultural Resources

Archaeological Resources

The site files at the Massachusetts Historical Commission (MHC), as well as the existing conditions reports previously undertaken for both the Newburyport and Rockport Branches, were consulted to identify potential impacts to recorded prehistoric and historic archaeological sites in the project corridor. Construction activity conducted within the rail ROW would not have a potential effect on archaeological resources since the sites would have been disturbed by previous construction activities.

There are several spots where rail restoration, station improvements, and siding/passing track installations would be situated in locations favorable for prehistoric sites. According to MHC, Native American groups generally situated their settlements on elevated ground along lakeside and riverine locations for the purpose of exploiting hinterland resources (MHC 1982: 18). Prehistoric archaeological sites associated with seasonal activities such as fishing and hunting migratory fowl during spring and fall will most likely be found along the elevated ground in wetlands and estuaries (MHC 1982: 28). Prehistoric resources may include features, but flake scatters and debitage associated with temporary or seasonal activities are more common. A good indication of seasonal exploitation of natural resources is shell middens. Most of the sites in the elevated regions are documented tool making or repair stations. The types of materials generally found in these locations include small tools such as scrapers, bifaces, and various projectile points. Points range in shape and size including Rossville points. Debitage refers to flake scatters and cores, the remnants or waste from tool making.

Historic Resources

For project areas where previous studies have been conducted by the MBTA, these studies were consulted. This includes the Newburyport Commuter Rail extension study, 1989. For areas not previously studied, the Massachusetts Historical Commission Inventory files were consulted to identify previously surveyed properties in or near the project area. The names of streets in the project area were discerned through the use of black and white aerial maps, MBTA transit maps found online, and street atlases. Precise locations of existing historic properties were not determined in this study, except where they had been mapped in previous MBTA reports. Because of the preliminary nature of the planning and the absence of an area of potential effects (APE), the review included a broad listing of resources in the general area listed on or eligible for the National Register or included in the MHC Inventory, and the estimates of level of impact were based on these listings.

Environmental Justice

The Boston Metropolitan Planning Organization (MPO) has developed criteria that identifies environmental justice neighborhoods, based on minority and low-income populations. “Neighborhoods” are defined by US Census geographic units: Census Blocks for minority population information and Census Block Groups for low-income information. The MPO uses US Census Bureau information to determine how each neighborhood relates to the minority population and low-income population in the entire MPO. Specifically, if the neighborhood is either more than 21.4 percent minority (the percent minority population within the MPO) or has a median income less than 75 percent of the median household income for the MPO ($55,800), then it is considered an environmental justice neighborhood. This Census information was mapped, using Geographic Information Systems (GIS) for the MIS study area. These maps are color-coded to show the location of environmental justice communities. The location of MIS projects, and their potential impacts were compared to these graphics to determine whether environmental justice communities would be affected.

The purpose of this section is to determine whether environmental justice neighborhoods would experience disproportionate environmental impacts from each of the projects. When environmental justice neighborhoods are affected by environmental impacts, it does not necessarily constitute environmental justice burdens. Other factors, including benefits and whether other populations are also affected, must be considered. If an environmental justice community experiences noise impacts due to increased service but it is also located proximate to the station and experiences service improvements, the project may not be one of disproportionate burden. Impacts to other populations are also considered. If project impacts are spread out along the ROW, with some occurring within environmental justice communities, it does not necessarily constitute an environmental justice impact. If, however, all of the project burdens along the ROW are concentrated within the environmental justice neighborhoods, there is potential for negative environmental justice impacts. The analysis of each project takes these factors into account in determining its potential for environmental justice impacts.

Land Use

There are two types of land use impact analyses. For direct impacts, which require property takings, mapped property ownership information is compared to plans that show the area required to build or implement each MIS project. Direct property impacts occur when the area required for the MIS project is not under MBTA ownership and must be acquired. Property ownership information is obtained from local assessors offices. A detailed analysis of direct land use impacts would include more specific information on the square feet of property to be acquired. At this level, however, a preliminary determination was made as to whether new ROW would be required and the scope of those ROW takings.

The information needed to analyze indirect impacts includes existing land use information, which is described in Chapter 2; local land use controls; and planning documents. The process for analyzing indirect impacts is explained in the following paragraph. In general, it involves identifying which projects would encourage secondary development, and determining whether or not that development would be consistent with the community's goals.

Specifically, the first step in determining potential indirect impacts was to determine which projects provide new service or construct new facilities and then to locate the access points for these services. Indirect impacts are most likely to occur at access points like stations or ferry terminals because of the additional pedestrian and automobile traffic rather than along railways or bus routes. Next, this study analyzed the existing land use information to determine whether there is potential for development and/or redevelopment around these access points. Some indications of development potential include parcels of vacant land. Redevelopment is most likely to occur in areas with vacant or underutilized buildings. After identifying access points with development or redevelopment potential, the final step is to determine whether potential development would be consistent with the goals of the community. At the national and state level there are planning initiatives that encourage specific types of development, including transit-oriented-development (TOD), which emphasizes dense, mixed-use activity centers that are proximate to transit and the redevelopment of existing infrastructure. Development that is consistent with these goals can benefit the communities interested in such development, while projects that are not consistent with community goals could negatively affect traffic circulation and quality of life for the community. A more detailed analysis of the proposed projects would include more information on existing land use, zoning regulations and other local planning documents. The purpose of this analysis is to provide a general evaluation of the potential for indirect impacts.

2.2 Ridership Methodology

The following section presents an overview of the travel model used in this project and describes each major step in the modeling process. It also includes a description of how the calibrated model was applied to the MIS alternatives.

The Central Transportation Planning Staff (CTPS) prepared weekday ridership forecasts for many of the proposed MIS service expansion projects. The transportation model that CTPS has built and maintains is the most accurate and sophisticated model for predicting future travel in the Boston Metropolitan Area. The forecasts from this model guide most of the transportation planning conducted by public agencies in Eastern Massachusetts.

The travel model simulates existing travel conditions and projects future-year travel on the region's transportation system. The model contains all MBTA rail and bus lines, all private express bus carriers, all express highways and principal arterials, and many minor arterials and local roadways. The region is subdivided into small areas, called traffic analysis zones (TAZs). The model simulates transportation supply and demand characteristics from and to each TAZ combination. The model relies on many inputs, which include population, employment, automobile ownership, transit fares, automobile operating costs, and transit and highway levels of service. The most recent available date is utilized to make sure the model simulation is reliable.

The travel model used for the North Shore Major Investment Study is based on the traditional four-step urban transportation planning process of trip generation, trip distribution, mode choice, and trip assignment. This process is used to estimate the daily transit ridership and highway traffic volumes, primarily on the basis of forecasts of study area demography and projected highway and transit improvements. For transit services the model also contains:

- service frequency (i.e. how often trains and buses arrive at any given transit stop),
- routing, and
- travel time.

Results from the computer model provide detailed information relating to transit ridership demand. Estimates of passenger boardings on all existing and proposed transit services can be obtained from the model output. The information derived from the model for each service analyzed included:

- New Transit Trips,
- Daily Transit Mode Share,
- Peak hour mode share (from study area to downtown Boston and Cambridge),
- Ridership Impact on other North Shore area transit services,
- Daily fare revenues,
- Air Quality Impacts, and
- Travel Time Savings.

A summary of the modeling results is provided in Appendix A.

Figure 3-1   Insert graphic of overall project locations

Gloucester Station Improvements

Description

This project includes the development of expanded commuter parking in a new, at-grade parking facility. Design and construction of approximately 100 new spaces in a new satellite parking lot, with dedicated vehicular access, application of ITS components, and an improved handicapped person accessible pedestrian grade crossing from the existing platform to the new parking facility and miscellaneous cosmetic improvements to the existing platform and canopy.

Capital Cost	**$3.6 million**
Existing Spaces	**78 spaces**
Net Additional Spaces from Project	**75 spaces**
2025 Forecasted Demand	**150 to 200 spaces**
Percent of 2025 Demand Met	**75 to 100%**

Assessment

Presently there are up to 78 potential parking spaces in the area of the Gloucester Commuter Rail Station to be used by commuters. Of these spaces, only 25 are owned and operated by the MBTA. The remaining 53 spaces are in private lots in the station area. Most spaces in the station area are used each weekday; those not used are typically a result of the lack of striping and the configuration of the spaces. The projected demand for parking at the Gloucester Station in 2025 calls for approximately 150-200 spaces.[2] This station has a significant pedestrian access percentage that is likely due to the station's convenient access from the developed downtown area. A review of potential environmental impacts has been conducted as a part of the project design phase efforts with no significant impacts identified.

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[2] Commuter Rail and Rapid Transit Parking and Ridership Demand Forecasts, CTPS, January 2002.

Beverly Depot Station Improvements

Description

This project includes the development of expanded commuter parking in a multi-level structure and associated pedestrian and vehicular access improvements at the Beverly Depot Commuter Rail Station. Design and construction of a realigned station drop-off and sidewalks; improved handicapped person pedestrian access; new station canopies; a 500 to 645 space, multi-level parking garage and pedestrian bridge access from the station platform.

Capital Cost	**$13.8 million**
Existing Spaces	**309 spaces**
Net Additional Spaces from Project	**363 to 508 spaces**
2025 Forecasted Demand	**700 to 800 spaces**
Percent of 2025 Demand Met	**100%**

Assessment

Presently there are up to 309 parking spaces in the vicinity of the Beverly Depot Commuter Rail Station that may be available for passenger parking. Of these spaces, 131 are privately owned and require a permit to utilize, while the other 137 are owned by the City of Beverly and are either in a lot or on the street. The public spaces are primarily full each day, while the usage of the privately permitted spaces varies. The projected demand for parking at Beverly Depot station in 2025 is approximately 700-800 spaces. [3] This high demand is due to the frequent service between Beverly and Boston.

Since there is no available MBTA land in the vicinity of the station, a preferred site needs to be identified and acquired. A study to identify the specific site and design of the proposed parking garage is currently underway. The design of this project is approximately at the 15% level of completion. Following a number of early work items, including the appraisal of properties necessary for the structural footprint of the proposed garage, a notice to proceed with design to the 30% level of completion will be issued. The possibility exists that this project could be a significant part of a larger commercial-residential transit-oriented development project currently under discussion for the area fronting Rantoul Street in Beverly.

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[3] Commuter Rail and Rapid Transit Parking and Ridership Demand Forecasts, CTPS, January 2002.

Salem Station Improvements

Description

This project includes the development of expanded commuter parking in a 700 to 1,000 space multi-level structure and associated pedestrian and vehicular access improvements at the Salem Commuter Rail Station. Additional project scope items include improved handicapped person pedestrian access from the street level grade to the station platform below. Passenger retail amenities could be included as part of the finished structure.

The possibility exists that the Department of Capital Asset Management (DCAM) could use part of the new structure to augment parking at the proposed, expanded Essex County Courthouse campus. If this occurs, a corresponding, per-space capital contribution to the project will match DCAM's requirements for parking.

Capital Cost	**$19,800,000**
Existing Spaces	**491 spaces**
Net Additional Spaces from Project	**209 to 509 spaces**
2025 Forecasted Demand	**700 to 725 spaces**
Percent of 2025 Demand Met	**100%**

Assessment

Presently there are 491 paid parking spaces at the Salem Commuter Rail Station. Of these spaces 340 are owned and controlled by the MBTA and 123 are owned and controlled by the City of Salem. Typically the only spaces that are not filled on a weekday are the 10 handicap spaces located in the MBTA owned lot. The projected demand for parking at the Salem station in 2025 is approximately 700-725 spaces. [4] The frequent service between Salem and Boston makes the commuter rail an attractive transportation option for commuters that drive to the station and park. The proposed garage could possibly serve multiple functions in downtown Salem serving not only MBTA commuter rail passengers but also possibly patrons of the Essex County Courthouse campus located only a block away. Currently, the project is undergoing schematic design. A review of potential environmental impacts will be considered in association with that effort.

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[4] Commuter Rail and Rapid Transit Parking and Ridership Demand Forecasts, CTPS, January 2002.

Winthrop to Boston Ferry Service

Description[5]

This Project includes implementation of a new commuter boat service from Winthrop to the downtown Boston waterfront. The proposed service would operate utilizing two 65 foot, 75 passenger vessels to operate along the 25 minute trip between the Winthrop Public Access Board's property on Shirley Street and Long Wharf in Boston with possible expansion to include a stop at the South Boston waterfront. The proposed service is anticipated to be operated by a contract operator hired directly by the Town of Winthrop.

Capital Cost	**$4,000,000**
Public Operating Cost	**$0**
Daily Ridership Increase on Mode	**600-900 trips**
Capital Cost/Transit Rider	**$4,500 to $6,700**
Operating Cost per Weekday Transit Rider	**$0**

Assessment

The Town of Winthrop is located on a peninsula only a few miles away from downtown Boston. Due to the topography and the configuration of the existing transportation network, opportunities to improve the surface transportation system in the Winthrop area are limited. The proposed ferry service would operate using two 65-foot long, 25-knot catamarans that have a capacity for 75 customers. It is projected that the 25-minute trip would attract approximately 600-900 trips daily with a one-way fare of $4.00. The proposed operating plan would include approximately four round trips each peak period and an off-peak service that may be conducive to non-commuter uses. This would serve primarily Winthrop commuter trips destined to Boston. Implementation of the service would require construction of a terminal in Winthrop with approximately 150 parking spaces at the proposed site on Shirley Street at the existing boat ramp facility. Improvement to the Winthrop Ferry Terminal would require a new pier and float, passenger waiting areas, public bathrooms, and office space.

The new terminal in Winthrop could result in increased traffic in the Shirley Street area. It is projected that approximately half of all passengers will access the ferry via automobile. Other passengers are projected to access the service by MBTA bus service, bicycle or walking. The impact to local Shirley Street traffic is projected to increase by approximately 5%.

The Town of Winthrop has determined that the ferry service could be self-sustaining through the use of a private operator if the capital costs associated with developing the terminal and pier facilities in Winthrop were paid for publicly. It is also projected that approximately $1.4 million of private investment in a vessel and other startup costs would be covered through the fares paid by passengers.

The existing study identified a number of optional configurations and site locations for consideration. Potential environmental effects include impacts from dredging, floodplain, and other coastal zone impacts. This project will be required to conform to federal and state permitting requirements prior to being implemented.

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[5] Sources: Winthrop Commuter Boat Feasibility Study, VHB et. al. January 2001.
Winthrop Commuter Boat Follow-on Study, CTPS, November 2003.

North Shore Bus System Improvements

Description

This Project includes the improvement of buses, bus-related equipment, passenger amenities and assessment of existing bus services in the North Shore. Specifically the Project will include the replacement of existing conventional diesel buses with compressed natural gas buses and environmentally clean diesel (ECD) buses; and installation of an Intelligent Transportation System (ITS) including Automatic Vehicle Locator systems and Automatic Passenger Counters. In addition to vehicle improvements, additional bus shelters would be installed at stops with high ridership and adequate space for shelters.

A study effort was undertaken to determine whether available bus system resources are being used as effectively as possible. The study examined current bus service on twenty-one bus routes in the North Shore, and recommended changes to all of the routes.

Assessment

Vehicles: One of the MBTA's strategic priorities during the coming years is to improve bus service throughout the service area. One way this priority is being realized is through investment in the bus fleet and related systems. System wide almost two-thirds of the bus fleet will be replaced by 2005; hundreds of buses from the 1980s will be retired, and the remaining fleets will be overhauled. Since the MBTA is continually assessing new types of bus technologies for use on the system, specific long-term details have not been finalized regarding what equipment will be employed on North Shore routes. However, it is certain that major investments are planned on the entire system, the North Shore routes included.

ITS: Part of this bus system improvement program includes implementation of recent technological advancements in bus operating and information systems. One of the primary improvements being considered is an ITS application that includes the Automatic Vehicle Locator technology. Providing real-time service performance data would give bus dispatchers more information with which to make immediate service adjustments and would give passengers information on the time of the next bus arrival.

Services: The study effort that was undertaken to examine the effectiveness of current bus service on twenty-one bus routes in the North Shore recommended changes to all of them. Changes ranged from route modifications to headway changes. All of the recommendations were implemented in June 2002.

Potential Impacts

Traffic Impacts

No traffic impacts are anticipated from the North Shore Bus System Improvements or the Equipment Improvements.

Potential Noise and Vibration Impacts

There are no noise or vibration impacts anticipated from the North Shore Bus System Improvements or the Equipment Improvements.

Air Quality Impacts

Some air quality improvements would result from the North Shore Bus System/Equipment Improvements components, as newer, cleaner, more environmental friendly vehicles are introduced into the system.

Wetland Impacts

No wetland impacts are anticipated from the North Shore Bus System Improvements or the Equipment Improvements.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources from the North Shore Bus System Improvements or the Equipment Improvements.

Protected Species Impacted

There are no anticipated impacts to protected species from the North Shore Bus System Improvements or the Equipment Improvements.

Impacted Archaeological Resources

There are no archaeological impacts anticipated from the North Shore Bus System Improvements or the Equipment Improvements.

Historic Properties Affected

There are no historic impacts anticipated from the North Shore Bus System Improvements or the Equipment Improvements.

Environmental Justice Impacts

The environmental justice effects of these improvements are fairly balanced. For example, increasing bus route frequency in an environmental justice community could be seen as an impact, but improving access to mass transit in these areas and for these populations would create a positive benefit. Benefits could also be realized by the community as newer, cleaner, more environmental friendly vehicles are introduced into the system

Land Use Impacts

This Project includes structure changes to major bus routes in the Lynn and Salem bus networks. Because the changes are only modifications of existing service, no land use impacts are anticipated.

Bus Equipment Improvements component

Because there is no new service or construction proposed, there are no anticipated land use impacts.

Newburyport Branch and Rockport Branch Increased Frequencies

Description

This Project includes increasing commuter rail service frequencies along both the Newburyport and Rockport Lines to maximize peak period service and provide increased off-peak service. In order to accommodate the proposed improved frequencies along the line, infrastructure improvements would be necessary. These improvements would include construction of passing/double track on the Newburyport Branch and three new commuter rail trainsets (See Figures 3-2 and 3-3).

The construction of passing/double track would be needed in two locations along the Newburyport Line, in Ipswich and Rowley. The proposed location of the second track / passing siding in Ipswich is approximately from Milepost 28.7 to 29.3. It would begin approximately 500 feet north of the High Street bridge and extend 3000 feet, over a private crossing (Perkins) and end before another private crossing (Mitchell's). The new track would be located within the existing ROW, along the existing double track embankment. The additional track would also require minor modifications to the signal system within the railroad ROW. These impacts are considered separately in the following Assessment section.

The location of the other proposed siding track is in Rowley approximately from Milepost 31.5 to 32.1. The siding would begin approximately 1,500 feet north of the Main Street Bridge and end approximately 1,500 feet south of the Main Street Bridge. The new track would be located within the existing ROW, along the existing double track embankment. The additional track would also require minor modifications to the signal system within the railroad ROW.

Capital Cost	**$62,000,000**
Operating Cost	**$9,492 per weekday**
Daily Ridership Increase on Mode	**5,500**
Net Increase in Daily Transit Ridership	**2,400**
Capital Cost/New Transit Rider	**$25,833**
Operating Cost per Weekday/New Transit Rider	**$3.95**
Capital Cost/Travel Time Benefit	**$101,974 per hour**
Operating Cost/Travel Time Benefit	**$15.61 per hour**
Travel Time Savings	**608 hours**

Assessment

For weekday service to Rockport, the scheduled travel time varies between 64 and 73 minutes, depending on the number of intermediate station stops. There are presently three morning peak period/inbound trains that operate from Rockport with one peak period/outbound train in operation. In the evening peak period, there are four peak period/outbound trains operating to Rockport with two peak period/inbound trains operating. During the off-peak period, service from Rockport generally operates on a 2-hour headway in both directions.

The scheduled travel time between Newburyport and North Station for weekday service varies between 59 minutes and 67 minutes, depending on the number of intermediate station stops. There are presently five morning peak period/inbound trains that operate from Newburyport and one that starts at Hamilton/ Wenham with one peak period/outbound train in operation that terminates in Hamilton/Wenham and another one that terminates in Newburyport. In the evening peak period, there are four peak period/outbound trains operating to Newburyport with two peak period/inbound trains operating. During the off-peak period, service from Newburyport generally operates on a two-hour headway in both directions.

Under this project, peak and off-peak commuter rail frequencies would be increased on the existing Newburyport and Rockport Lines. On both lines, total daytime operations would increase from 27 to 39 trains per day. The number of trains on the Rockport line during the morning commute would increase from four to six; on the Newburyport line, they would increase from seven to nine in the morning, while in the evening the number of trains on both the Rockport and Newburyport lines would increase from six to seven.

The proposed Project would ultimately add one additional peak period train on both the Newburyport and Rockport Branches in both inbound and outbound directions. In addition, the proposed Project would include substantial increases in the operation of off-peak services to result in hourly service in each direction on each branch, thereby doubling the amount of service presently operated in the off-peak.

The proposed service plan for the full implementation of the Project would add 10 to 13 new trains in each direction running between the terminals and North Station in Boston. Additional service would be included between Lynn and Boston as a shuttle service to offer ten minute peak-period service between those two cities. In order to balance the system schedule, without clustering trains, modifications to the service schedules of many of the off-peak trains would be necessary. However, the result would be a schedule which generally improves headways to no longer than one hour at any time of day. The new service trains would predominantly be operated during the off-peak with one train added in each direction during peak periods. The limitation on additional peak period trains is a result of known constraints in Salem, at the single track Salem Tunnel, and the constrained ability of the North Station terminal area to accommodate any additional peak-period trains.

Potential Impacts

Traffic Impacts

Under this Project, the morning peak hour volumes decrease at ten of the sixteen locations, compared to the No-Build Project. All four locations in Revere, two locations in Salem, two locations in Peabody, and two locations in Danvers indicate volume decreases. Volume increases occur at two locations in Salem and two locations in Peabody. The volumes at one location in Peabody and one location at Danvers remain unchanged. The largest volume decreases occur in Revere, while the largest increase is in Salem, along Route 114 Eastbound, north of Mason Street.

The Newburyport Branch and Rockport Branch Double/Passing Track component
No traffic impacts are anticipated.

Noise and Vibration Impacts

These service increases are expected to affect residential and office receptors differently. According to Federal Transit Administration (FTA) guidelines, impacts are assessed relative to current conditions. This means that by definition, no areas are currently impacted along the existing line. For residential receptors along portions where the line will not be double tracked, average hourly noise levels are expected to increase by about 1 decibel on each line. By increasing the operations along the line by a third, the actual day-night sound level from the new trains alone will be about 4 decibels less than from the existing trains. However, this will still be loud enough to result in impacts along the line; nearby residential locations within about 300-400 feet of grade-crossings, and within about 100-150 feet of the line will be impacted for trains moving at 70 MPH, depending on the existing background noise level and local building, terrain, and vegetation conditions. A detailed examination of impacts will be necessary for this Project. Vibration impacts will be unchanged along the route assuming train speeds do not increase under this Project. An examination of aerial photos along the Newburyport lines shows that only a few noise impacts should occur in Newburyport, about a dozen in Rowley, about 25-35 in Ipswich, and between 40-80 in Beverly. Along the Rockport line, between 50-100 locations are expected to have noise impacts due to service increases in Beverly, about ten in Manchester, between 40-80 in Gloucester, and none in Rockport.

For commercial receptors, the peak number of trains per hour would not change during the business hours of 9 to 5. Therefore, there will be no additional impacts at commercial receptors along these routes. Vibration impacts would be unchanged along both routes for locations not near passing sidings, as vibration impact determination is not based on service frequency.

The Newburyport Branch and Rockport Branch Double/Passing Track component

This Project would result in differing impact condition changes for noise and vibration. For noise, this component would result in operations being occasionally moved over from one track to another about 15 feet along the passing sidings. This would result in a slight increase or no increase in noise levels for the area on the side near the new track, depending on the train speeds on the passing track. It would cause a slight decrease in noise levels on the side near the old track, equivalent to moving the existing track over by between 3 and 7 feet, depending on the number of trains per day using the passing siding. Overall, this by itself would result in only a few noise impacts along the corridor; it should be evaluated in conjunction with proposed changes in service levels accompanying the installation of passing sidings.

For vibration, the construction of passing sidings would increase the impact distance on the side nearest the passing sidings track by 15 feet for all areas, including the Salem tunnel. For the Rowley passing siding, there should be no new impacts, as the siding is located in an uninhabited area north of Rowley Station. For the Ipswich passing siding, there appears to be only one receptor that would be affected by the proposed passing siding.

Air Quality Impacts

The additional ridership attracted by these service improvements would increase the volumes of vehicles accessing and parking at the affected stations. To the extent that there are consequent increases in traffic congestion and delays at key intersections, local pollutant concentrations may increase. Air quality impacts at a regional scale will be positive because increased rail ridership will reduce the total vehicle-miles traveled (VMT) in the region. This reduction in VMT is expected to more than offset the increase in locomotive emissions from the additional trains. The net regional effects will be beneficial, but there is also the potential for increases in local pollutant concentrations.

The Newburyport Branch and Rockport Branch Double/Passing Track component

These improvements could increase the frequency for Newburyport Branch, and therefore would have similar impacts on air quality. Though the net regional effects will be beneficial, there is the potential for increases in local pollutant concentrations.

Wetland Impacts

There are no anticipated wetland impacts for this Project. The area along the Newburyport Branch, north of Ipswich, however, is within the Parker River/Essex Bay Area of Environmental Concern (ACEC). As this Project progresses, further investigation would be required as to impacts to this ACEC.

The Newburyport Branch and Rockport Branch Double/Passing Track component

Although there are wetlands that occur along the ROW, none are in the same location as the proposed passing siding. Therefore, there are no anticipated wetland impacts for this Project. The area along the Newburyport Branch, north of Ipswich, however, is within the Parker River/Essex Bay ACEC. As this Project progresses, further investigation would be required as to impacts to this ACEC.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources.

The Newburyport Branch and Rockport Branch Double/Passing Track component

As mentioned in the previous section, in the area north of Ipswich along the Newburyport line, the ROW crosses the Parker River/Essex Bay ACEC.

Protected Species Impacted

There are no anticipated impacts to protected species.

The Newburyport Branch and Rockport Branch Double/Passing Track component

As mentioned in the description, work along the Newburyport Branch north of Ipswich is the only area with the potential for impacts to protected species. There are direct impacts from the Ipswich Siding (1500 feet on the east side of track), and the Rowley Siding (2000 feet on the east side of the track). There could also be 600 feet of direct impact from Gloucester to Rockport.

Impacted Archaeological Resources

No archaeological impacts are anticipated.

Newburyport Branch and Rockport Branch Double/Passing Track component

There are at least seven known sites in the area that are associated with seventeenth and eighteenth century house-lots. The sites include remnants of residential lots with features such as privies, wells, cisterns, and building foundations. The potential construction activities are located within the ROW, however, which has been previously disturbed, so there are no anticipated impacts.

Historic Properties Affected

This project does not require work outside of the existing ROW.

Newburyport Branch and Rockport Branch Double/Passing Track component

No historic impacts are anticipated from increased frequencies of commuter rail service on the double/passing track component.

Environmental Justice Impacts

There would not be environmental justice impacts associated with this alternative. Noise impacts along the ROW would be the major impact resulting from this alternative, but they would not disproportionately affect environmental justice neighborhoods. First, the majority of the neighborhoods along the ROW are relatively affluent and do not fit the MPO definition of environmental justice neighborhoods. In addition, the few environmental justice neighborhoods that are located along the ROW are clustered around station areas where they would benefit from the increased service, off-setting any potential noise impacts.

Newburyport Branch and Rockport Branch Double/Passing Track component

The siding would be located in Ipswich and Rowley where there are no environmental justice communities. No environmental justice impacts are anticipated.

Land Use Impacts

This Project refers to increasing commuter rail frequencies along both the Newburyport and Rockport lines to maximize peak period service and provide increased off-peak service. Improving commuter rail service on an active line to existing stations would not cause any land use impacts.

Newburyport Branch and Rockport Branch Double/Passing Track component

Because all of the new track would be located within the existing rail ROW, there would not be any indirect or direct land use impacts.

3-2 Ipswich Siding Graphic

3-3 Rowley Siding Graphic

Rockport Station Improvements

Description

This Project includes access improvements to the station platform, and physical and operational improvements to the adjacent layover facility. Additional improvements would include the construction of approximately 90 additional parking spaces and improved station amenities.

The proposed improvements would encompass the modifications envisioned in a previous MBTA design study that examined potential improvements to the Rockport Station site. These proposed improvements include construction of approximately 90 additional parking spaces and repaving and striping the existing parking lot at the station. Additional improvements such as lighting and station entrance improvements may be necessary. Other improvements at the site include:

- ☐ Consolidation of layover tracks at the location of existing Tracks #2 & #4.
- ☐ Construction of a full length high-level platform from the end of the station to the present location of Poole's Lane next to Tracks #2 & #4.
- ☐ Remove Track #6 and replace it with a pedestrian walkway to the baseball field.
- ☐ Close Poole's Lane grade-crossing, providing access to baseball field and adjacent business via the MBTA parking lot

Capital Cost	**$6 million**
Existing Spaces	**85 spaces**
Net Additional Spaces from Project	**90 spaces**
2025 Forecasted Demand	**100 to 125 spaces**
Percent of 2025 Demand Met	**100%**

Assessment

The Rockport Commuter Rail Station presently has 85 parking spaces located off of Railroad Avenue that are all owned by the MBTA. There presently is no daily charge for parking in the lot. The lot is not effectively striped and many users park in unpaved sections. The parking lot is presently over capacity and demand exceeds the capacity of existing spaces, (118% usage of spaces).[6] Projected 2025 demand for parking calls for 100 to 125 spaces. In addition, tracks for the layover facility are scattered around the site without any fencing or security. The station platform is a low-level platform without high-level access, rendering the station inaccessible for disabled passengers. This station, the Prides Crossing Station in Beverly and the Chelsea Station are the only non-accessible stations on the Newburyport/Rockport Line. The Rockport Station is also the only terminal station on the MBTA's commuter rail system that is not handicap accessible.

Potential environmental impacts have been investigated and are noted in the Rockport Commuter Rail Station Improvements, Schematic Design Report (1999). The potential adverse affects primarily relate to the areas historic and wetland resources. There are two historic structures, the Boston and Maine Railroad Freight Yard Crane and Freight House that would be potentially affected. The MBTA's goal is to preserve these resources, if they can be maintained on site, while still making improvements. The report also identified wetland resources that would be affected: work will occur within the 100-foot buffer zone to a Bordering Vegetated Wetland and within the riverfront zone of Mill Brook.

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[6] Commuter Rail and Rapid Transit Parking and Ridership Demand Forecasts, CTPS, January 2002.

3-4 Rockport Station Graphic

Lynn to Boston Ferry Service

Description

This Project includes implementation of a new high-speed commuter boat route from Lynn to Logan Airport and the downtown Boston waterfront. The proposed ferry service would require the construction of a ferry terminal with parking in Lynn, and the acquisition of new vessels (See Figure 3-5).

Terminal: A ferry terminal would need to be sited in Lynn Harbor. The proposed site at Blossom Street would require construction of a new 120 foot by 30 foot dock, parking for approximately 300 to 350 cars and a small shelter and drop off area for bus passengers[7]. The existing pier would require repair and stabilization but appears to be sufficient to accommodate the needs of the ferry service. Although some dredging may be required to accommodate the proposed ferry it appears unlikely until more detailed bathymetry is conducted.

Vessels: The proposed ferry is a 149 passenger vessel with low wake and wash and is capable of speeds of 30 to 35 knots. The vessel would be fully compliant with the Americans with Disabilities Act of 1990 and would be similar to the Flying Cloud which operates to Martha's Vineyard and Nantucket.

Capital Cost	**$9,000,000**
Operating Cost	**$935,000 annually**
Daily Ridership Increase on Mode	**600**
Capital Cost/New Transit Rider	**$15,000**
Operating Cost per Weekday/New Transit Rider	**$1,558**

Assessment

The proposed service would provide direct commuter ferry service between Lynn and downtown Boston during weekdays. Other routes and services originating from Lynn may be possible during off-peak periods during the summer season. The route would run from the proposed terminal in Lynn 15 statute miles (13.6 nautical miles) to Long Wharf in downtown Boston. The proposed service would operate each weekday between 6 AM and 9:30 PM providing service every 30 minutes during peak periods and every 2 hours during off-peak periods. The estimated peak-period trip time between the two terminals is approximately 35 minutes. During summer season off-peak trips, it is proposed that the ferry would make an additional stop at the Harbor Islands, thereby extending the one-way trip time to approximately 55 minutes.

Potential Impacts

Traffic Impacts

While there would be some increase in traffic levels due to this project, no substantial traffic impacts are anticipated.

Noise and Vibration Impacts

This Project would result in no residential noise impacts, as there are no residences in the proposed dock area or on the access roads leading to it. There may be one or two commercial noise impacts along

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[7] Draft Water Transportation Planning for Eastern Massachusetts: A Strategic Assessment of Passenger Ferry Services, Massachusetts Executive Office of Transportation and Construction, March 2003.

Blossom Street. There should be no vibration impacts due to this Project. Construction noise and vibration may impact one or two receptors on Blaney Street, especially during pile driving.

Air Quality Impacts

This project is expected to generate some ferry-related traffic volumes. This combined with an increase in emissions from ferry engines would generally characterize the nature of the new emissions sources associated with this project. However, it is expected that the overall impact would be a net reduction in emissions, which would mainly be attributable a reduction in regional automobile emissions. Depending on the age and power rating of the ferry engines, mitigation of these emissions might be recommended. On the other hand, a net reduction in regional emissions from vehicles would be expected.

Wetland Impacts

This Project would have wetland impacts. The ferry terminal is within the harbor area and the ferry berth is within a Marine Subtidal resource area. 4,800 feet of the ferry service parking lot edge is within a wetland buffer.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources.

Protected Species Impacted

There are no anticipated impacts to protected species.

Impacted Archaeological Resources

No archaeological impacts are anticipated.

Historic Properties Affected

No historic impacts are anticipated.

Environmental Justice Impacts

There would be ROW impacts associated with this Project. However, there are no residences in the proposed dock area or on access roads leading to it so no environmental justice impacts are anticipated. This project would also relieve the environmental justice neighborhoods from the existing burden of through trains by providing commuter rail service to residents.

Land Use Impacts

There would be direct and indirect land use impacts with this Project. The proposed site for the Lynn Ferry Terminal is located off of Blossom Street. This facility would include 300-350 parking spaces and a small shelter and drop off area for bus passengers. Property acquisition would be required to construct this facility. The existence of the new transit station could also create new opportunities/pressures for transit-oriented development to service the ferry riders.

3-5 Lynn Ferry Terminal Graphic

Revere Commuter Rail Station

Description

This Project includes a new station on the Newburyport/Rockport commuter rail line in Revere near the existing Wonderland Blue Line station. The proposed station would consist of two high-level side platforms with a canopy and an accessible pedestrian overpass between the two platforms. The station would also include a bus/automobile waiting area in front of the station along Dunn Road (See Figure 3-6). No parking is included at this time because of ongoing redevelopment discussions associated with the Wonderland Racetrack. It is assumed that parking would be incorporated as part of a new station.

Capital Cost	**$10,500,000**
Operating Cost	**Negligible**
Daily Ridership Increase on Mode	**400**
Net Increase in Daily Transit Ridership	**200**
Capital Cost/New Transit Rider	**$52,500**
Operating Cost per Weekday/New Transit Rider	**Negligible**
Capital Cost/Travel Time Benefit	**$145,833 per hour**
Travel Time Savings	**72 Hours**

Assessment

The Project would improve accessibility to the commuter rail system from the City of Revere and the Wonderland area. Presently access to the commuter rail system from Revere requires either a bus trip north to Lynn Station or use of the Blue Line at Wonderland to connect to the Orange Line at State Street Station before reaching North Station. Both of these circuitous routes effectively eliminate use of the commuter rail for travel in Revere even though 60 trains pass through the City each weekday.

The proposed station would be located northwest of the Wonderland Greyhound Park. Facilities at the station would be similar to other MBTA commuter rail stations providing high-level platforms, passenger shelters and a canopy. Access to the station would be from the east side of the tracks off of Route 1A, using Dunn Road as the primary access point. An accessible pedestrian overpass would be constructed to provide safe access to the west side (inbound) platform. Infrastructure improvements would include realignment of the track necessary to accommodate the station.

Potential Impacts

Traffic Impacts

Under this Project, the morning peak hour volumes decrease at three locations, increase at two locations, and remain unchanged at the other eleven locations, compared to the No-Build Project. All three decreases occur at locations in Revere, while the two locations with volume increases are at Revere and Salem. Volumes at three locations in Salem, all five locations in Peabody, and all three locations in Danvers remain unchanged.

Noise and Vibration Impacts

For this Project, noise and vibration levels for residential areas along the tracks approaching the station should decrease due to lower train speeds coming in and out of the station, with a slight increase near the station due to passenger activity and train idling at the station

For this project, peak vibration levels will decrease by between 4 and 10 VdB for receptors near the tracks in the vicinity of the new station due to slower train speeds, resulting in fewer impacts along the track entering and leaving the area. Overall, since there appear to be no residents directly adjacent to the station, there should be no noise or vibration impacts at this station. A few receptors north of the station within 50 feet of the track may experience slightly higher vibration levels if the track is realigned more than 5- 10 feet closer. There may be some impacts due to construction activities north and south of the station associated with track realignment into the station.

Air Quality Impacts

The lack of additional parking at the Revere Commuter Rail Station; the fact that vehicle access to the station will be relatively circuitous via Dunn Road and residential streets; and the presence of existing transit services at the Blue Line Wonderland Station, suggest that the vehicle volumes accessing the station may be less than would otherwise occur. In that event, both the reduction in regional emissions and any increase in local pollutant concentrations would be relatively slight.

Wetland Impacts

Some of the improvements would be within wetland buffer zones. Specifically, 250 feet of the Dunn Road Improvements would occur within 100 feet of the buffer zone of one wetland and 875 feet of platform and canopy would be within a 100 feet of the buffer zone for the ditch and wetland on the west side Since these are minor impacts to buffer zones, there are no anticipated wetland impacts for this Project.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources.

Protected Species Impacted

There are no anticipated impacts to protected species.

Impacted Archaeological Resources

No archaeological impacts are anticipated.

Historic Properties Affected

Because this project potentially requires the acquisition of property, the Wonderland Dog Racing Track, (State listed as MHC # 900), could potentially be affected.

Environmental Justice Impacts

There are both environmental justice neighborhoods and non-environmental justice neighborhoods surrounding this station and there would be land use impacts associated with this Project. It is not likely that potential land takings would affect residences, however, because there are none in the immediate vicinity. Potential indirect impacts, as noted in the land use impacts section, could be positive with appropriate planning. Additionally, this station would improve access for area residents by providing another transit alternative. As such, potential impacts would not disproportionately affect environmental justice neighborhoods because they would benefit from improved access to transit options. This project would also relieve the environmental justice neighborhoods from the existing burden of through trains by providing commuter rail service to residents.

Land Use Impacts

Direct land acquisition would be required for the station area site as MBTA does not own adequate property to construct the station. Indirect impacts to this area could be positive, given the potential for transit-oriented development (TOD). Although the commuter rail station would complement and enhance existing redevelopment proposals, adequate planning should occur to assure that the station construction does not create negative indirect impacts.

3-6 Revere Station Graphic

South Salem Commuter Rail Station

Description

This Project includes a new station on the Newburyport/Rockport commuter rail line south of downtown Salem, between the existing Salem and Swampscott stations (See Figures 3-7 and 3-8). The proposed station would consist of a single center island platform with a canopy and an accessible pedestrian overpass between the roadway and the platform. The station would also include a bus/automobile waiting area in front of the station near the intersection of Ocean Avenue and Broadway.

Capital Cost	**$12,200,000 to $13,800,000**
Operating Cost	**Negligible**
Daily Ridership Increase on Mode	**600**
Net Increase in Daily Transit Ridership	**400**
Capital Cost/New Transit Rider	**$30,500 to $34,500**
Capital Cost/Travel Time Benefit	**$203,334 to $230,000/hour**
Travel Time Savings	**60 Hours**

Assessment

The proposed station would be located near the intersection of Broadway and Ocean Avenue, although an exact location has not been established. Currently there is not a commuter rail station in South Salem although over 60 trains pass through the area each weekday. The new station would provide direct commuter rail service to a section of Salem now served only by a bus route that requires a transfer at either the Salem, Swampscott, or Lynn commuter rail stations to travel to downtown Boston.

Facilities at the proposed station would be similar to other MBTA commuter rail stations providing a high-level platform and canopy, and a drop-off and pick-up area, however the amount of parking would depend on the selected site and the City. Access to the station would be from the east side of the tracks off of Canal Street. In addition to the bus connection, pedestrian connections between Canal Street and the station would be improved. Additional necessary infrastructure improvements would include the realignment of mainline and freight spur tracks in order to accommodate the station.

Two schematic designs have been developed for this Project. One design utilizes the so-called "former bowling alley" site, while the other design uses a parcel that is just to the north of Ocean Avenue. Neither Project locations have parking spaces dedicated to commuters although some short-term parking spaces could be developed to aide people waiting to pick up commuters. Both designs integrate space for a bus/shuttle stop to accommodate any possible shuttle service between Salem State College and the station.

Potential Impacts

Traffic Impacts

Under this Project, the morning peak hour volumes decrease at five of the sixteen locations, compared to the No-Build Project. All four locations in Revere and one location in Salem indicate a volume decrease. The only two locations with volume increase are in Salem: Canal Street, Southbound, north of Ocean Street, and Route 1A Southbound, north of Washington Street. Volumes at all five locations in Peabody, all three locations in Danvers, and one location in Salem remain unchanged.

Noise and Vibration Impacts

Noise impacts along the track due to train operations should be expected to substantially decrease near the station due to slower train speeds; however, noise levels near any potential parking facilities could affect some local nearby receptors.

Peak vibration levels will decrease by between 4 and 10 VdB for receptors near the tracks due to slower train speeds, resulting in fewer impacts in this area, although some receptors within 50 feet of the track may experience higher vibration levels if the track is realigned more than 5- 10 feet closer. Some residential receptors near the station may experience noise and vibration impacts during construction, as well as receptors near locations where the track will be realigned leading into the station.

Air Quality Impacts

Local pollutant concentrations may increase due to traffic increases in the vicinity of the South Salem Station. Air quality impacts at a regional scale would be positive because new rail ridership would slightly reduce the total vehicle miles traveled (VMT) in the region. Though the net regional effects will be slightly beneficial, there is potential for increases in local pollutant concentrations.

Wetland Impacts

There are no anticipated wetland impacts for this Project.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources.

Protected Species Impacted

There are no anticipated impacts to protected species.

Impacted Archaeological Resources

Because this Project requires the taking of land outside the ROW, there is potential for archaeological impacts to Prehistoric Site 19-ES-538.

Historic Properties Affected

There are no previously identified historic properties in the vicinity of this project area and no historic impacts are anticipated.

Environmental Justice Impacts

This Project would have some noise and ROW impacts. There would be some decrease in impacts to the environmental justice community located southeast of the proposed station area because of slower train speeds near the station. These residents would also benefit from having a direct commuter rail connection. Therefore, no disproportionate environmental justice impacts are anticipated. This project would also relieve the environmental justice neighborhoods from the existing burden of through trains by providing commuter rail service to residents.

Land Use Impacts

Because this project requires new construction on land not presently owned by the MBTA, property acquisition would be required. However, there could be both positive and negative impacts associated with potential transit-oriented or transit-induced development created by the addition of the station.

3.7 South Salem Station (North) Graphic

3.8 South Salem Station (South) Graphic

Salem-Danvers via Peabody Commuter Rail Service

Description

This proposed Project would implement a new commuter rail service on the Danvers Secondary Branch between Salem and Danvers, passing through Peabody Square (See Figure 3-9, sheets 1 through 3). This line would branch off the Eastern Route Main Line (ERML) north of the Salem Tunnel, travel to downtown Peabody along an active freight line, and then follow one of two inactive railroad lines west of Wall Street in downtown Peabody. The two alignment options beyond Peabody Square would both terminate near Route 128 exits. The southern branch (North Shore Mall Option) would terminate near Route 128/Exit 26; the northern branch (Danversport Option) would run into Danvers and terminate near Route 128/Exit 23. For either alternative alignment a new commuter rail station is proposed at Peabody Square. A station would be located near Exit 26 for the North Shore Mall Option and near Exit 23 for the Danversport Option. In addition to the track work and stations construction, bridge replacement and grade crossing upgrades would also be required as part of the project.

Trains would operate along the Eastern Route Main Line originating at North Station in Boston making station stops between Boston and Salem. North of Salem the service would serve a new station at Peabody Square before serving the terminal station adjacent to Route 128, in either Danversport or the North Shore Mall in Peabody. This Project would be approximately a 3.5 mile extension, including the new stations and a train layover facility. Capital improvements would include the upgrade and construction of track, grade crossing improvements, new bridges across Proctor Brook and the Waters River, a parking structure at both Peabody Square and the terminal station and the purchase of new commuter rail equipment.

	Danversport Option	North Shore Mall Option
Capital Cost	**$119,500,000**	**$125,000,000**
Operating Cost	**$5,555 per weekday**	**$5,555 per weekday**
Daily Ridership Increase on Mode	**5,600**	**6,000**
Net Increase in Daily Transit Ridership	**2,200**	**2,600**
Capital Cost/New Transit Rider	**$54,300**	**$48,100**
Operating Cost per Weekday/New Transit Rider	**$2.53**	**$2.14**
Capital Cost/Travel Time Benefit	**$191,200**	**$165,600**
Operating Cost/Travel Time Benefit	**$8.88**	**$7.32**
Travel Time Savings	**625**	**755**

Assessment

This Project would provide new commuter rail service to Peabody and Danvers. The proposed terminal station locations would be near Route 128, which would serve potential riders not only from Peabody and Danvers but also any other potential rider heading toward Boston from north of Peabody. Approximately 25% of the riders projected to board in Peabody and Danvers would be existing riders diverted from boarding commuter rail in other locations, such as Beverly and Salem. Service along the proposed branch line would operate approximately every half hour during peak periods and one to two hour headways during off peak periods.

Potential Impacts

Traffic Impacts

Danvers via Peabody Commuter Rail Service (Danversport Option)

The morning peak hour volumes decrease at thirteen of the sixteen locations, compared to the No-Build Project. These locations include all four locations in Revere, all four locations in Salem, three locations in Peabody, and two locations in Danvers. The volumes at Route 114 Eastbound, north of Prospect Street in Peabody, and Route 35 Southbound, north of Route 128 increase, compared to the No-Build Project. Volumes at one location in Peabody remain unchanged. The largest decrease in volumes occurs at Route 1 Southbound, South of Route 60 in Revere.

Danvers via Peabody Commuter Rail Service (North Shore Mall Option)

The morning peak hour volumes decrease at ten of the sixteen locations, compared to the No-Build Project. All four locations in Revere, three locations in Salem, two locations in Peabody, and one location in Danvers indicate volume decreases. Volume increases occur at two locations in Peabody and one location in Danvers. The volumes at one location in Salem, one location in Peabody and one location at Danvers remain unchanged. The largest decrease in volumes occurs at Route 1 Southbound, South of Route 60 in Revere.

There are several unsignalized and signalized intersections along the corridors for project options. that currently operate at unacceptable Levels of Service (LOS) of E or F during the morning and evening peak hours. The addition of vehicles that would be entering and exiting the new commuter rail station parking facilities, coupled with additional trains operating over the grade crossings along the corridor would adversely impact the traffic operation in the area, specifically at several locations in Peabody.

Noise and Vibration Impacts

Potential noise and vibration impacts may occur at several locations along both proposed alignment options. These locations would be in each corridor community, Salem, Peabody, and Danvers. Overall, the total number of potential impacts along each alignment option would appear to be under 200; however, the longer alignments included in the Danversport Option would appear to have more impacts than the shorter alignments of the North Shore Mall Option..

In Salem, both Options travel near Bridge Street, Flint Street, Oak Street, Friend Street, River Street, Grove Street and Silver Street, so it would appear likely that some noise and vibration would occur at residences along these streets. Train horns blowing at grade crossings near Flint, Oak and Grove Streets should result in additional impacts. In Peabody, there may be a few commercial noise impacts along Main or Walnut Streets and some residential noise and vibration impacts along Endicott Streets for all options. Commercial vibration impacts along Main and Walnut Streets appear unlikely.

For the North Shore Mall Option, it would appear that a few noise impacts would occur along Castle Circle, and Jennifer Lane in Peabody. There may be noise and vibration impacts at one or two locations on Warren Street. Additional noise impacts may occur on Proctor Street due to locomotive idling; vibration impacts appear unlikely due to low train speeds at this location. Some wheel squeal impacts appear possible for residential locations south of the North Shore Mall for the alignment furthest west. (See Figure 3-9, Option 1A).

For the Danversport Option, noise and vibration impacts would appear likely along Smidt, Ash, Bowditch, North Central and Andover Streets in Peabody. Depending on the specific alignment (See Figure 3-9, Option 2A and 2B), Purchase Street, Merrill Street, and Cheever Street in Danvers would appear likely to have some impacted noise locations; there may be one or two impacted vibration locations along these streets as well. Possible noise impacts would be expected at Hood Terrace and Pleasant Avenue in Danvers if the alignment terminates nearby due to locomotive idling (See Figure 3-9, Option 2-A). Wheel squeal could impact residences near Pleasant Avenue even though they are separated from a tight curve by Route 128 (See Figure 3-9, Option 2A). Impacts could occur along Needham and Hutchinson Streets in Danvers if the alignment that passes nearby where to be implemented. Regardless of the specific alignment and terminal location it does not appear that more than one to two dozen noise and vibration impacts would be likely to occur for the Danversport Option.

Construction noise and vibration on any proposed project would affect a large fraction of the receptors affected by the operational noise and vibration, especially for track laying and bridge reconstruction. A detailed noise and vibration construction mitigation plan will be necessary prior to the beginning of work.

Air Quality Impacts

The new ridership associated with each project option would result in increased vehicle volumes and may cause greater traffic congestion and delays at key intersections near the new stations. Local pollutant concentrations may increase in the vicinity of these intersections and stations. Air quality impacts at a regional scale would be positive because new rail ridership would reduce the total vehicle miles traveled (VMT) in the region. This reduction in VMT is expected to more than offset the increase in locomotive emissions from additional trains. This pattern of local and regional impacts is expected to occur regardless of the station location selected. Though the net regional effects will be beneficial, there is the potential for increases in local pollutant concentrations at multiple locations.

Wetlands

Each wetland option would result in some wetland impacts. From Salem to Peabody, five wetland communities (3,600 linear feet) would be impacted on the north side and four wetland communities (3,750 linear feet) would be impacted on the south side. Since this route crosses over the Proctor Brook and it’s associated wetlands at four locations the overall impacts in this option are expected to be high. The length of Riverfront Area along this route would be approximately 7,500 feet.

Along the Danversport Option, three wetland communities would be impacted on the east side (2,000 linear feet), while three wetland communities would be impacted on the west side (4,000 linear feet). The impacts associated with this option are largely associated with two major waterway crossings. Riverfront Area impacts would be approximately 3,600 linear feet for this option.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources.

Protected Species Impacted

There are no anticipated impacts to protected species.

Impacted Archaeological Resources

Both options require the acquisition of and construction along new ROW. The following are archaeological resources that could be affected by potential construction:

Salem to Peabody Square
- ☐ Salem Prehistoric Sites: 19-ES-592 – Boston Street Site, 19-ES-639 – Historic Indian Settlement, 19-ES-642 – Buffum's Field Site
- ☐ Peabody Prehistoric Sites: 19-ES-481 – Shyrnd's Farm, 19-ES-495 – Tremont Site

Danversport Option
- ☐ Danvers Prehistoric Sites: 19-ES-389 – Endicott Pear Tree Site, 19-ES-404 – Hussey Estate, 19-ES-575 – Gray's Brickyard Site, 19-ES-265 – Endicott Burial Ground/Creasex Crook Tannery Site, 19-ES-387

North Shore Mall Option
- ☐ Peabody Prehistoric Sites: 19-ES-463

Historic Properties Affected

Since both options require the acquisition of land for the right of way and for the new stations, there is the potential for historic impacts. Following is a list of area historic resources, by location.

Salem
- ☐ Properties Listed on the National Register: Carpenter Street: seven properties, Flint Street: fifteen properties, Lafayette Street: 51-55 (Salem Laundry), Lynn Street: nine properties, North Street: eight properties, River Street: seventeen properties
- ☐ Properties Listed on the State Register: Lafayette Street: 33 properties
- ☐ Eligible Properties: 242 Bridge Street (Salem Railroad Signal Tower), 76 Lafayette Street (Elevator Works Building)
- ☐ Inventoried Properties: Beckford Street: fifteen properties, Carpenter Street: one property, Goodhue Street: two properties, Grove Street: nineteen properties, Flint Street: eighteen properties, Lafayette Place: three properties, Lafayette Street: 71 properties, Mason Street: twenty-five properties, North Street: fifty-six properties, Oak Street: eight properties, Silver Street: seven properties

Salem to Peabody

There are two bridges along the rail segment between Salem and Peabody that would be replaced. Single-track railroad bridges would be replaced with double-track bridges.

- ☐ Inventoried Bridges: Howley Street Bridge over North River, North Central Street Pedestrian Bridge, Water Street Bridge over the Crane River

Peabody Square
- ☐ Properties Listed on the National Register: Peabody Civic Center Historic District, Washington Street Historic District

Danversport Option

Danvers
- ☐ Properties Listed on National Register: 59 Endicott Street (Sprague House), 15 Sylvan Street (Peabody Institute Library of Danvers),

- ☐ Inventoried Properties: Andover Street: two properties, Ash Street: nine properties, Clinton Avenue: twenty-five properties, Endicott Street: eighteen properties, Merrill Street: one property, Purchase Street: one property, Sylvan Street: sixteen properties, Water Street: sixteen properties

- A historic graveyard has been reported in the vicinity of Endicott Plaza containing the graves of several Endicott family members. At this time it is unclear if this graveyard has ever been evaluated for historic significance. Present plans call for avoiding it.

- Inventoried Bridges: Andover Street Railroad Bridge, Endicott Street Bridge, Waters River Bridge, Water Street Bridge over the Crane River

North Shore Mall Option

Peabody

- Inventoried Properties: Andover Street: six properties; Central Street: six properties; North Central Street: one property; Crowninshield Street: one property; Howley Street: several properties; Lowell Street: sixty-one properties; Prospect Street: two properties; Wallis Street: one property; Walnut Street: two properties

Environmental Justice Impacts

There are environmental justice neighborhoods in Peabody Square and one in Danvers. Both of these areas are near proposed commuter rail station sites. Impacts associated with this Project include the acquisition of ROW, noise impacts and impacts to cultural resources. Because of potential access benefits, however, these impacts would be off-set and environmental justice neighborhoods would not be disproportionately impacted.

Land Use Impacts

The options would require right of way acquisition as well as additional land area for station locations. There is potential for indirect land use impacts at the access points. The location of the first access point, in downtown Peabody, is consistent with state and national planning initiatives that encourage the use of existing infrastructure and transit-oriented-development (TOD). The downtown location ensures that the station area would be served by Peabody's infrastructure and services. Also, the Peabody Master Plan has indicated that the City is working on increasing pedestrian safety in the downtown area. The combination of pedestrian improvements with commuter rail service would support an active downtown.

The second access point has two potential locations, depending on which option is chosen. The North Shore Mall Option would end at a new station in the vicinity of the North Shore Mall, while the Danversport Option would terminate at a new station near Endicott Plaza. There are potential indirect impacts at both of these locations. However, since both access points would be located near existing commercial centers (the North Shore Mall or the Endicott Plaza) these access points are also consistent with planning initiatives that support the use of existing infrastructure and TOD.

Salem-Danvers via Peabody Commuter Rail Service

This Project would meet the MIS study goals of (1) Improving Community Access, and (2) Upgrading Existing North Shore Service by adding a new transit service to the area, (3) Promoting North Shore Economic Growth, and (5) Encouraging Community Oriented Design through possible coordination of development opportunities near the Peabody Square station. This Project has been categorized as a medium-term priority. Initial ridership projections indicate that this Project would result in approximately 3,000 commuters boarding the new commuter rail service each weekday. However, these projections assume unconstrained, discounted parking at each new station. Once specific parking and access attributes are further defined, the projected ridership may be affected.

This service would provide transportation benefits to communities throughout the North Shore area by increasing the overall capacity of the transit system thereby relieving pressure on existing services.

Although it is recognized that the service could have significant benefits, additional efforts would need to be advanced prior to implementation, including a more detailed engineering feasibility study, permitting and design. In recognition of the work that would need to occur to advance the project and the financial resources necessary to implement the Project it is projected to occur during a medium-term time frame (10 to 20 years)

After analyzing the alternative alignments and terminal locations it is further recommended that the proposed option for the Project be the Danversport option that terminates near Endicott Street in Danvers (See Figure 3-9, Option 2-D & 2F). This route appears to result in the least potential impacts while minimizing costs and maintaining connectivity between the proposed service and Route 128. The North Shore Mall option, which runs parallel to Lowell Street is adjacent to Proctor Brook and appears to have significant wetland, noise and traffic impacts to the neighborhoods along the route. The Danversport option alignments which extend north of Endicott Street would require additional bridges to cross over the Crane River and significant roadway work to provide access from Route 128. Although this is the recommended project definition, additional studies will need to be undertaken to confirm this preliminary assessment.

The Project could be implemented in a phased approach, initiating service first to Peabody Square and then to the terminal station. The segment of track between the existing Salem Station and the proposed Peabody Square station does not require improvements as substantial as the other proposed segments since it is currently being used by a freight rail operator. Traffic impacts could also be minimized by avoiding use of the grade crossings in Peabody Square. The first phase, providing service to Peabody would cost approximately $72 million, with half for infrastructure improvements and half for new rail equipment. This first phase would attract approximately half of the ridership projected for the full build which would have a Route 128 terminus.

3.9 Peabody Graphic (Sheet 1)

3.9 Peabody Graphic (Sheet 2)

3.9 Peabody Graphic (Sheet 3)

Newburyport/Rockport Line Coaches

Description

This Project would consist of the purchase of 54 bi-level commuter rail coaches for the Newburyport/Rockport Line to accommodate projected growth in demand on the line.

Capital Cost **$135,000,000**

Assessment

Newburyport/Rockport Line ridership projections for 2025 indicate the need for seven-car bi-level trains to operate along the line[8]. Presently the MBTA operates five to seven car trainsets with single level coaches on the Newburyport/Rockport Line. In addition the trainsets rotate during the day between all routes on the MBTA's North Side commuter rail system. In order for a dedicated bi-level fleet large enough to accommodate projected 2025 peak-period demand, 54 bi-level coaches would be required. Purchase of bi-level coaches to meet projected growth would accommodate projected demand without impacting existing schedules or services.

Potential Impacts

Traffic Impacts

No traffic impacts are anticipated.

Noise and Vibration Impacts

New bi–level coaches may cause a slight increase in noise levels, depending on the number and type of vehicles added to the line. Overall, this level should be less than 1-2 decibels. Noise levels from new equipment should be evaluated in conjunction with proposed service frequency changes, if possible.

Air Quality Impacts

No air quality impacts are anticipated.

Wetland Impacts

There are no anticipated wetland impacts for this Project.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources.

Protected Species Impacted

There are no anticipated impacts to protected species.

Impacted Archaeological Resources

No archaeological impacts are anticipated.

Historic Properties Affected

This project does not require work outside of the existing ROW; therefore, no historic impacts are anticipated.

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[8] Commuter Rail and Rapid Transit Parking and Ridership Demand Forecasts, CTPS, January 2002.

Environmental Justice Impacts

There are no environmental justice impacts expected from this project.

Land Use Impacts

There are no anticipated land use impacts.

Newburyport Branch and Rockport Branch Station Improvement Program

Description

This Project includes passenger amenity improvements to stations along the Newburyport/Rockport Commuter Rail Line. The goal of the program is to improve conditions for train boarding and alighting and provide improved accessibility to service at the Newburyport and Rockport Branch stations. The capital components of the Project that were considered were the construction of high-level platforms at three stations.

	Beverly Farms	Montserrat	North Beverly
Capital Costs	**$3,000,000**	**$4,800,000**	**$8,000,000**

Assessment

The ability to provide high-level platforms depends on the physical constraints in the station area and the community context of the existing station. Many of the stations are contextually sensitive to the existing character of the area and the changes caused by the installation of high-level platforms and the associated stairs and ramps (and possible pedestrian overpasses) could result in dramatic topographic and visual changes to the neighborhood. At many of the stations, existing low-level platforms provide connectivity with neighborhood sidewalks and accommodate passenger walkways which cross the tracks at grade. Therefore, the insertion of high-level platforms at some stations would result in significant impacts likely to be unacceptable.

After review of the potential for improvements at all stations along the branches, including track curvature constraints, it is recommended that not every station be reconfigured to include a high-level platform. This Project included specific consideration of the following improvements at certain stations along the Newburyport and Rockport Branches.

Beverly Farms Station

The proposed improvements would include construction of a new high-level platform, approximately 450 feet long on the outbound side between the Beach Street grade crossing and the existing end of the platform (See Figure 3-10). The length of the high-level platform would not be full length (800 feet) so as to minimize impacts to adjacent roadways. The new high-level platform would include an accessible ramp on the southern end. This would permit passengers to cross the tracks at the existing Beach Street grade crossing to access the parking lot and station building, both located on the inbound side of the tracks. In general the new high-level platform would be the same size and in the same location as the existing low-level platform.

Montserrat Station

The proposed improvements would include construction of new high-level platforms on each side of the tracks. The new high-level platforms would be approximately 450 feet long, extending from the Spring St. grade crossing to the Essex St. grade crossing (See Figure 3-11). The length of the high-level platform is would not be full length (800 feet) so as to minimize impacts to the adjacent roadways.

The outbound platform would include a ramp located on the northern end in the vicinity of the existing mini-high level platform and ramp. A set of stairs would be located approximately at the mid-way point of the platform, thereby providing a second means of egress from the platform. The design of the platform would be similar to existing MBTA high-level platforms including benches, railings and lighting.

The inbound platform would include an accessible ramp on the southern end, providing a connection from the platform to Spring St. and the existing Spring St. grade crossing. A set of stairs would be located on the northern end of the platform, thereby providing a second point of access and providing a connection to the Essex St. side of the station. The new high-level platform would include a new canopy, benches, railings, lighting, as well as the standard tactile warning strip on the track-side of the platform.

North Beverly Station

The proposed improvements would include construction of new high-level platforms on each side of the tracks. These new high-level platforms would be approximately 840 feet long, extending from near the Dodge St. grade crossing northerly, slightly past the end of the existing low-level platform (See Figure 3-12).

The outbound platform would include an accessible ramp located on the southerly end, providing a connection from the platform to Dodge Street and the existing Dodge Street grade crossing. The design of the platform would be similar to existing MBTA high-level platforms, which are approximately 12 feet wide and include benches, railings, lighting and a tactile warning strip on the track-side of the platform.

The inbound platform would include a short accessible ramp between the southerly end of the platform and the existing parking lot. This would provide the most convenient access between the parking lot and the new platform for all passengers. The new high-level platform would include a new canopy, benches, railings, lighting, as well as a tactile warning strip on the track-side of the platform.

Potential Impacts

Traffic Impacts

No traffic impacts are anticipated for any of the projects.

Noise and Vibration Impacts

This Project would not cause noise or vibration impacts at any stations but there may be minor construction impacts associated with work at each location.

Air Quality Impacts

The proposed high-level platforms and accessibility improvements at Beverly Farms, Montserrat, and North Beverly Stations would not alter traffic circulation in and around these stations. Although the improved boarding and accessibility will improve the attractiveness of the stations for passengers, the resulting increases in ridership are expected to generate only minimal increases in traffic volume and parking demand, compared to existing traffic levels.

Wetland Impacts

There are no wetlands within 100 feet of any of the stations. There are no anticipated wetland impacts for the any of the projects.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources.

Protected Species Impacted

There are no anticipated impacts to protected species.

Impacted Archaeological Resources

Since potential construction activities are located within the ROW, which has been previously disturbed, there are no anticipated impacts.

Historic Properties Affected

This project does not require work outside of the existing ROW; therefore, no historic impacts are anticipated.

Environmental Justice Impacts

There are no environmental justice communities near these stations; therefore, environmental justice impacts are not anticipated.

Land Use Impacts

No land use impacts are expected for any of the stations.

3-10 Beverly Farms Graphic

3-11 Montserrat Graphic

3-12 North Beverly Graphic

Newburyport Branch and Rockport Branch Highway Grade Crossing Improvements/Elimination Program

Description

This Project includes a program for improvements to and/or elimination of the existing grade crossings along the Newburyport/Rockport Line. A preliminary assessment of grade crossings along the line indicates that the most significant project component of the grade crossing program would be at the Eastern Avenue grade crossing in Chelsea (See Figure 3-13). Since this grade crossing has one of the highest Annual Average Daily Traffic (AADT) volumes along the line and is a segment of track that has a large number of daily train movements over the crossing, it has one of the higher levels of exposure to potential accidents. In addition, since it is not immediately adjacent to another grade crossing, major cross street, natural resource, or intensive land use the ability to grade separate the crossing is not constrained.

There is presently a speed restriction at the Eastern Avenue at-grade crossing in Chelsea that limits train speeds to 30 miles per hour for safety reasons. There are a high percentage of trucks that use the grade crossing due to the adjacent truck-reliant industries. The proposed elimination of the Eastern Avenue grade crossing would not only improve train speeds through the area it would eliminate a rail-related hazard from the roadway network.

The proposed grade crossing elimination would include a roadway bridge to carry Eastern Avenue over the railroad. The proposed bridge would be approximately 26 feet above the existing tracks to allow for sufficient railroad clearance. The roadway approaches to the bridge would be re-graded, using retaining walls to bring the surface of the roadway up to the bridge. Changing the elevation of the roadway would result in the need for some additional roadway changes, such as closing Crescent Avenue at the intersection of Crescent and Eastern Ave. and rerouting traffic along Vila Street and Dudley Street. In addition business entrances just south of the crossing would need to be realigned along a new roadway to provide safe access onto Eastern Avenue.

Capital Cost	**$19,600,000**

Assessment

The proposed grade crossing in Chelsea would have some direct land use impacts including the need for land acquisition and the realignment of the adjacent intersection and some adjacent driveways. Traffic would also be affected as a new route would be required for some traffic passing through the area and accessing local businesses.

The Project for the improvement of the Eastern Avenue grade crossing would result in two major benefits. It would improve safety to both commuter rail riders and highway users by minimizing the opportunities for accidents to occur at the grade crossing. It would also improve the travel time of the commuter rail service by eliminating the speed restriction associated with the grade crossing.

Potential Impacts

Traffic Impacts

Although this location has not been modeled, it is expected that some traffic impacts could be created by the rerouting of traffic due to the closure of the existing crossing.

Noise and Vibration Impacts

At this location, noise impacts should decrease due to the cessation of locomotive horns and warning bells, even though the train noise will increase slightly due to higher train speeds. Vibration impacts should increase slightly due to higher train speeds (increasing from 30 MPH to 60 MPH) which would increase the impact distance by between 30 and 50 feet, depending on location. This may result in a few new commercial receptor impacts at this location. Some receptors nearby also may be affected by construction noise and traffic detours/rerouting.

Air Quality Impacts

This improvement could increase the frequency for the Newburyport Branch, and therefore would have a similar increase on air quality emissions. Though the net regional effects will be beneficial, there is the potential for increases in local pollutant concentrations.

Wetland Impacts

There are no anticipated wetland impacts for this Project.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources.

Protected Species Impacted

There are no anticipated impacts to protected species.

Impacted Archaeological Resources

No archaeological impacts are anticipated.

Historic Properties Affected

This project does not require work outside of the existing ROW; therefore, no historic impacts are anticipated.

Environmental Justice Impacts

The City of Chelsea has many environmental justice neighborhoods, including some in the area of the grade crossing elimination. The removal of the at-grade crossing in Chelsea would improve traffic safety for the City. Noise impacts would be reduced and vibration impacts increased slightly. Considering the safety and noise benefits, this Project is not anticipated to have substantial environmental justice impacts.

Land Use Impacts

The proposed grade crossing in Chelsea would have some direct land use impacts and traffic impacts. There are a number of trucks that use the existing grade-crossing because of an adjacent truck-reliant industries and eliminating the grade crossing would eliminate potential truck and rail confrontations. This project would also require the realignment of the intersection and some adjacent driveways, resulting in land takings. Traffic would be affected as a new route would be required for traffic passing through the area and accessing local businesses.

3-13 Eastern Avenue Graphic

Beverly to Boston DMU/Shuttle Service

Description

This Project includes the implementation of a new diesel multiple unit (DMU)/Shuttle Service between Beverly Station and North Station in Boston operating on the Eastern Route Main Line to augment the existing services along the line. The proposed service would require the purchase of four DMU vehicles plus new layover and servicing facilities. Although a specific site has not been identified for a possible storage and maintenance facility it has been included in the project analysis and cost estimates as a known project requirement.

Capital Cost	**$18 million**
Operating Cost	**$3,100,000 annually**

Assessment

This Project would make service between Beverly and Boston's North Station more convenient for passengers traveling during off-peak hours since it would allow the MBTA to offer additional service by using Diesel Multiple Units (DMUs) in addition to the MBTA's standard five to eight coach push-pull train sets. The resultant service would allow at least 30 minute headways throughout the day. However, due to constraints along the line, such as the single track Salem tunnel and capacity of North Station, any new service is proposed to operate only during the off peak hours. It is projected that by using a smaller trainset the daily operating costs of the additional trains would be less than if a full trainset were used thereby permitting more flexibility in scheduling.

At present, only one railcar manufacturer in the world offers a model of DMU that complies with current Federal Railroad Administration crash-safety standards. So far, only a single demonstrator car has been built, so there is no experience with actual operating and maintenance costs. Estimates for DMU operating and maintenance costs used are those that have been previously developed based on international and historical DMU operations. The capital cost above is based on an estimate of $3.4 million per car. Any model of DMU would be expected to require some specialized maintenance facilities. Since the MBTA already has a shortage of storage space for existing equipment a new facility would need to be built in a location convenient to the Boston to Beverly corridor. A specific site has not been identified for a possible storage and maintenance facility. Potential impacts below focus on the implementation of DMU service. Depending on the location of maintenance facilities, potential environmental impacts could result.

Potential Impacts

Traffic Impacts

No traffic impacts are anticipated.

Noise and Vibration Impacts

There are no noise or vibration impacts anticipated.

Air Quality Impacts

No air quality impacts are anticipated.

Wetland Impacts

There are no anticipated wetland impacts for this Project.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources.

Protected Species Impacted

There are no anticipated impacts to protected species.

Impacted Archaeological Resources

No archaeological impacts are anticipated.

Historic Properties Affected

This project does not require work outside of the existing ROW; therefore, no historic impacts are anticipated.

Environmental Justice Impacts

No environmental justice impacts are anticipated.

Land Use Impacts

No land use impacts are anticipated.

Newburyport Branch and Rockport Branch Signal System Upgrades

Description

This Project includes enhancements to the railroad signal system with the provision of a cab signal system on the Eastern Route Main Line in order to facilitate the operation of additional trains, particularly during peak periods. Installation of the signal system enhancements would predominantly include electrical and signal work within the railroad ROW and the MBTA's Operations Control Center.

Capital Cost	**$162,000,000**

Assessment

This Project to install signal system enhancements is projected to result in a reduction of signal delays, improved operating flexibility and improved operational safety. This Project could also facilitate operation of additional trains, particularly during peak periods.

The specific system recommended for this upgrade is a Continuous Cab Signal System. Continuous cab signal systems receive a steady stream of signal information from a system in the rails in order to ensure safe train operation. The data received is continually scrutinized by the system's onboard computer in order to determine speed conditions and to issue subsequent alerts to the train engineer. Although the details of these systems can be customized based on the type of signal data emitted by the railroad, the proposed system would be similar to that presently used on the South Side (lines operating out of South Station) MBTA lines.

Infrastructure required to install the system includes new track circuitry and supervisory control facilities along the entire line. Existing MBTA locomotives and control coaches are already equipped with cab signal apparatus for use on South Side MBTA lines.

Potential Impacts

Traffic Impacts

No traffic impacts are anticipated.

Noise and Vibration Impacts

There are no noise or vibration impacts anticipated.

Air Quality Impacts

No air quality impacts are anticipated.

Wetland Impacts

There are no anticipated wetland impacts for this Project.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources.

Protected Species Impacted

There are no anticipated impacts to protected species.

Impacted Archaeological Resources

No archaeological impacts are anticipated.

Historic Properties Affected

This project does not require work outside of the existing ROW; therefore, no historic impacts are anticipated.

Environmental Justice Impacts

No environmental justice impacts are anticipated.

Land Use Impacts

Because there is no new service or construction proposed, there are no anticipated land use impacts.

Second Salem Tunnel

Description

This Project includes the construction of a second tunnel through downtown Salem to alleviate one of the major constraints to improving peak period commuter rail frequencies both north and south of Salem. The proposed improvements would include construction of a second track within a new tunnel in Salem, between Mill Street and Bridge Street to accommodate additional rail traffic (See Figure 3-14). The new tunnel would approximately follow the same path as the existing tunnel underneath Washington Street. The construction of the new tunnel would need to be conducted in a manner to minimize impacts to the surface environment and to the integrity of the existing tunnel. The construction cost has been estimated based on an initial evaluation of site conditions and design concepts. Details of construction phasing and mitigation for elements such as traffic, utilities, and abutters have yet to be developed.

Capital Cost	**$130 million**

Assessment

One of the major constraints to increasing the peak period level of service on the Newburyport/Rockport Commuter Rail Line is the Salem Tunnel. This section of single track in the tunnel and at Salem Station limits the number of trains that can travel between Salem and Boston during peak periods. In fact, during peak periods the tunnel currently operates at or near capacity. Elimination of this physical constraint would contribute to greater flexibility in the scheduling and frequency of trains along the entire Newburyport/Rockport Commuter Rail Line.

The existing single-track Salem tunnel was built in two segments during the 1950's by the Boston & Maine Railroad under Washington Street through the Salem business district. As it was built under the western half of Washington Street, the location seemed to anticipate an eventual widening of the tunnel to accommodate two tracks.

This Project would include a second tunnel that would be built to the east of the existing tunnel. There would be three typical sections:

- Through the narrowest portions of Washington Street, the second tunnel would be built next to the existing tunnel, sharing a common center wall.
- South of this area, there would be some distance between the tunnels, particularly in the vicinity of the existing pump station and vent shaft just north of Mill Street.
- At Mill Street, it would be necessary to remove the existing roof and construct a wider tunnel.

Due to the tunnel's location in downtown Salem, there is a potential for significant disruption to local traffic during construction. The duration and extent would depend on construction staging. It is currently anticipated that the new tunnel would be constructed by the top-down, slurry wall method, which would minimize impacts on adjacent buildings and reopen the street to traffic sooner than other construction methods. Initially the slurry walls would be constructed, followed by the roof. With the roof in place, the street could be restored while the tunnel is mined out below the roof. North of the tunnel, the new double tracked alignment would be carried northwards through the existing station to connect with the existing double tracking at Northey Point. This would necessitate constructing a new Salem Station. The new station would have a single, island platform serving each track. It would be connected to the proposed garage and to Bridge Street.

Potential Impacts

Traffic Impacts

Adequate maintenance and protection of traffic plans would be required to address impacts during construction.

Noise and Vibration Impacts

There should be no changes in noise levels associated with the new Salem tunnel, except for a few receptors near the entrances. Since the Salem tunnel would be constructed using a cut-and-cover method, major construction impacts will likely occur, requiring a construction noise mitigation plan.

For the Salem tunnel, assuming that the train moves at an average speed of 40 mph through the tunnel, as specified by the MBTA for the North Shore Draft Environmental Impact Statement (DEIS), the number of vibration impacts along the Salem tunnel should increase by about 10-15% over the existing number. There may be considerable construction impacts associated with work on the Salem tunnel; depending on specific constructability parameters. A construction vibration mitigation plan will be necessary for any tunnel construction scenario.

Air Quality Impacts

This improvement could increase the frequency for Newburyport Branch, and therefore would have similar increases in air quality emissions. Though the net regional effects will be beneficial, there is the potential for increases in local pollutant concentrations.

Wetland Impacts

There are no anticipated wetland impacts for this Project.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources.

Protected Species Impacted

There are no anticipated impacts to protected species.

Impacted Archaeological Resources

There is one Prehistoric Site - 19-ES-511 – that has the potential to be impacted because the Second Salem Tunnel requires the acquisition of property outside of the ROW.

Historic Properties Affected

The Second Salem Tunnel would require property outside of the ROW and is located near a number of historic resources, so there is potential for significant historic impacts. The Second Salem tunnel would be located within the Downtown Salem National Register Multiple Resource Area (NRMRA), which is a combination of four National Register Historic Districts. Following is a list of specific properties within the area that could potentially be impacted:

> **Properties Listed on the National Register**: **Historic Districts**: Both sides of Washington Street from New Derby and Norman Streets on the south to Bridge Street through the corridor are within the Downtown Salem NRMRA, which envelops four National Register (NR) Historic Districts including Downtown Salem NR District, Federal Street NR District, Old Town Hall NR District, Essex County Court Building Complex NR District

Individual Properties: Salem City Hall (93 Washington Street), Joshua Ward House (150 Washington Street), Rufus Choate House (14 Lynde Street), U.S. Post Office (4 Margin Street), 3, 10, 13 Barton Square, 30, 33 Church Street, Essex Street: all properties, Federal Street: all properties, Washington Street: all properties

Environmental Justice Impacts

This project has the potential for land use, construction and noise impacts for surrounding residents, and is located in downtown Salem. Downtown Salem does have an environmental justice neighborhood (known locally as The Point) and, therefore, there is some potential for impacts to this environmental justice community. The tunnel, however, would remove one of the major constraints to improving commuter rail frequencies, resulting in the benefit of increased access to transit for these same neighborhoods and off-setting these impacts.

Land Use Impacts

There are potential direct impacts associated with the Second Salem Tunnel. A small amount of property would likely be acquired and there would be some disruption to the surface environment. This disruption would be minimized to the extent possible. Additionally, most of the disruption would be temporary, during construction.

3-14 Second Salem Tunnel Graphic

Salem to Boston Ferry Service

Description

This Project includes implementation of a new seasonal, high-speed commuter boat route from Salem to Logan Airport and the downtown Boston waterfront. A similar route was run experimentally in 1998, but with much less frequent service than analyzed here. Ridership was determined to be for tourist-oriented trips rather than daily commuters. The Project would include the purchase of two medium-size vessels and construction of a new terminal in Salem which would include approximately 190 parking spaces to accommodate riders.

Capital Cost	**$6,000,000**
Operating Cost	**$862,000 annually**

Assessment

Under this Project, seasonal ferry service would be implemented between downtown Salem and the Logan Airport area in Boston. This would assume the use of sea-going ferries of type usable for year-round open ocean conditions, similar to those used between Falmouth and Nantucket. The proposed route would require acquisition of two medium-size high-speed commuter-type boats, and construction of a new terminal in Salem with park-and-ride facilities[9]. The proposed site of the Salem Ferry Terminal would be located off of Blaney Street in Salem (See Figure 3-15). The Salem Ferry Terminal would include parking for approximately 190 cars, a small terminal shelter for ticket sales and passenger waiting and a ferry berth. Landscaping and other passenger and public amenities would be developed pending a final site plan for the parcel[10].

The concept of re-instituted ferry service is a core component of Salem's Harbor Plan and an integral part of development of the North Commercial Waterfront and Industrial Port. The infrastructure necessary for the ferry service could be coordinated with the planned New Salem Wharf project, thereby minimizing capital costs and annual operating costs. Ridership modeling was not conducted for this project since a high percentage of ridership is non-commuter based and highly responsive to marketing, which is not captured in standard transportation modeling. However, the former demonstration project that was run with travel times competitive with commuter rail service established that there is a market for a seasonal ferry service as long as the travel times and schedule are conducive to both commuters and tourist traffic. Average ridership for the demonstration service was about 500 riders per day and approximately 30% were work-based trips.

The expected trip time is approximately 50 minutes and would operate on weekdays between 6 AM and 9 PM. The service would make stops in Boston at Long Wharf or Rowe's Wharf depending on berth availability. Optional stops could be considered at the South Boston waterfront (World Trade Center) during peak periods and the Boston Harbor Islands (Georges or Spectacle Island) during off peak times.

Potential Impacts

Traffic Impacts

While there would be some increase in traffic levels due to this project, no substantial traffic impacts are anticipated.

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[9] Draft Water Transportation Planning for Eastern Massachusetts: A Strategic Assessment of Passenger Ferry Services, Massachusetts Executive Office of Transportation and Construction, March 2003.

[10] The City of Salem still does not retain ownership of the parcel at this time.

Noise and Vibration Impacts

This Project might result in a few noise impacts for residents near Salem Harbor at the junction of Blaney Street and Derby Street due to some increased traffic. There may be some impacts for residents at the proposed dock location on Blaney Street due to ferry horns. There should be no vibration impacts due to this Project. There may be some construction noise and vibration impacts on Blaney Street, especially during pile driving.

Air Quality Impacts

Six ferry round trips daily would generate a relatively small amount of emissions from the ferry's engines, and a relatively small volume of vehicle traffic. Because the service would be seasonal, no impacts would occur during cold weather when inefficient fuel combustion in vehicle engines leads to the highest carbon monoxide (CO) emissions and concentrations.

Wetlands

There are potential wetland impacts associated with this Project. The ferry terminal is within the harbor area and the parking area could impact 7,500 square feet of excavated pond. 600 feet of the parking lot edge is within a wetland buffer zone.

Impacted Vegetation and Wildlife Resources

There are no anticipated impacts to vegetation and wildlife resources.

Protected Species Impacted

There are no anticipated impacts to protected species.

Impacted Archaeological Resources

This Project requires the acquisition of new ROW so it has the potential to impact Prehistoric Site 19-ES-599.

Historic Properties Affected

This Project could result in historic impacts because property acquisition is required within a historic district. There are a number of nearby historic resources included in the Derby Waterfront Historic District. The proposed location for the new ferry terminal is also near the Salem Maritime Historic Site.

Environmental Justice Impacts

Most of the neighborhoods surrounding the proposed ferry terminal are not environmental justice communities. There are some environmental justice neighborhoods, however, and these communities would be impacted the same as other surrounding communities. Potential impacts are primarily ROW acquisition. Because there are impacts to both environmental justice neighborhoods and non-environmental justice neighborhoods and because impacts to these neighborhoods would be off-set by improved access to new transit service, there are no anticipated environmental justice impacts.

Land Use Impacts

There would be direct and indirect land use impacts with this Project. The proposed site for the Salem Ferry Terminal is off of Blaney Street in Salem. This facility would include parking for approximately 190 cars, a small terminal shelter for ticket sales and passenger waiting and a ferry berth. Property acquisition would be required to construct this facility. Further, some indirect development could occur as a result of the new facility.

3-15 Salem Ferry Terminal Graphic

Chapter 4

Recommendations

Project Rating Methodology

1.0 Introduction

This chapter outlines the prioritization of potential investments that were identified during this MIS process. During this study there were many different ideas for transit improvements on the North Shore since there are already diverse transportation modes operating within the corridor. Some proposed projects are relatively small, while others would certainly require major capital investments. Because there was such a diverse range of projects, the final study recommendations can be used as a "road map" of how to proceed with making improvements in the area with limited financial resources. The MIS ratings also help identify how all the projects may fit together to achieve the overall goal of improving transit opportunities on the North Shore.

Each individual project in the North Shore Transit Improvements Project-MIS has been evaluated regarding how it meets the study's goals and objectives. As stated previously, these goals and objectives, as well as the projects included in the MIS Universe of Projects, were developed through an extensive public outreach process that was designed to build consensus on the North Shore. Each set of goals has been carefully composed to ensure that they reflect the requirements and desires of the North Shore communities, as stated during the time of the study process.

Following a review of how each individual project met the goals and objectives, each project was then analyzed with regard to its projected benefits and its potential technical, social and environmental impacts. Assessments were conducted to identify the overall impacts of each project. This information was then used to identify major challenges that would need to be overcome to implement a project.

The final element of the MIS analysis involved a review of these projects within the system-wide constraints of the MBTA. This system review is an essential part of the analysis because it identifies system constraints, conflicts, or other unknowns that need to be considered when advancing the project. Each project needs to be measured against not only the needs, resources and planned improvements of the North Shore, but also of the remainder of the MBTA's service area. This final review allowed the proposed projects to be prioritized in accordance with the resources of the entire MBTA system.

These three reviews were then compiled to prioritize MIS projects into Short-Term, Medium-Term and Long-Term categorizations. The expected time frame that corresponds to those priority ratings are as follows:

- Short-Term: 0 to 10 years
- Medium-Term: 11 to 20 years
- Long-Term: Greater than 20 years

The time frame for implementation or priority for any one individual project could change as a result of a change in conditions, community desires, or financial support from sources outside of the MBTA.

As noted previously, a number of the early Steering Committee meetings for the MIS focused on developing goals for the MIS analysis. These goals, finalized at a meeting in May 2001, are categorized into community, transportation, economic, environmental, and design areas as noted below:

Improve Community Access
- Access to Logan Airport
- Access to Employment Centers
- Intercommunity Access
- Improved Access to Boston

- Provide Service for North Shore Commuter Students
- Access during Off-peak (inbound & outbound)
- Services for Transit Dependent Populations

Upgrade Existing North Shore Service

- Improve Transit Feeder Service
- Add more Transit Stops
- Increased Commuter Rail Frequency
- Better Intermodal Connections/Stations
- Additional Parking Capacity
- Additional Transit Capacity
- Provide More User-Friendly Service

Promote North Shore Economic Growth

- Encourage New Employers to North Shore
- Keep North Shore Town Centers and Businesses Accessible
- Promote Tourist Connections to the North Shore

Minimize Environmental Impacts

- Air Quality Standards
- Reduce Roadway Congestion

Encourage Community Oriented Design

- Multi-use Design
- Promote Bicycle and Walk Alternatives
- Focus on Station Design to Promote Livability in Urban Centers

These goals and objectives were used as one component in the project evaluation process.

Project Rating Summary

Table 4-1 provides a summary of the priority recommendations for the North Shore Transit Improvements Project-MIS.

Table 4-1 MIS Universe of Projects

Project	Short-Term	Medium-Term	Long-Term
Gloucester Station Improvements	✓		
Beverly Depot Station Improvements	✓		
Salem Station Improvements	✓		
North Shore Bus System Improvements	✓	✓	
Newburyport Branch and Rockport Branch Increased Frequencies	✓	✓	✓
Rockport Station Improvements		✓	
Lynn to Boston Ferry Service		✓	
Revere Commuter Rail Station		✓	
South Salem Commuter Rail Station		✓	
Winthrop to Boston Ferry Service		✓	
Salem-Danvers via Peabody Commuter Rail Service		✓	
Newburyport/Rockport Line Coaches		✓	✓
Newburyport Branch and Rockport Branch Station Improvement Program			✓
Newburyport Branch and Rockport Branch Highway Grade Crossing Improvements/Elimination Program			✓
Beverly to Boston DMU/Shuttle Service			✓
Newburyport Branch and Rockport Branch Signal System Upgrades			✓
Second Salem Tunnel			✓
Salem to Boston Ferry Service			✓

Project Ratings

Gloucester Station (Short-Term)

This Project would meet the MIS study goals of (2) Upgrading Existing North Shore Service through providing a more user-friendly service, improving intermodal connections, and adding parking supply; and (5) Encouraging Community Oriented Design by improving the station area design and integrating multimodal, pedestrian and bicycle needs.

This Project has been categorized as a short-term priority. The proposed modifications to the station area would improve the integration of the station with the community and its transit-oriented development initiatives, meet 75 to 100% of the projected 2025 parking demand by maximizing parking opportunities in the station area, and provide an improved facility for making connections between MBTA commuter rail service and Cape Ann Transportation Authority (CATA) bus service. The design phase of the project is currently underway and is presently in the 100% design review stage. Funds have been allocated for the project in the Transportation Improvement Program and Air Quality Conformity Determination for FY 2004 to FY 2008. The construction phase is projected to begin in the late spring of 2004 when the project will be advertised for construction.

Beverly Station (Short-Term)

This Project would meet the MIS study goals of (2) Upgrading Existing North Shore Service through providing a more user-friendly service, improving intermodal connections, and adding parking supply; (3) Promoting North Shore Economic Growth through keeping the town center of Beverly accessible, and (5) Encouraging Community Oriented Design by improving the station area design and integrating pedestrian and bicycle needs.

This Project has been categorized as a short-term priority. The proposed parking garage would meet 100% of the projected 2025 parking demand. The proposed garage may result in additional benefits to the community, such as additional retail parking, depending on the selected site, garage layout and project financing. It also has the potential to support transit-oriented development. Funds for the design and permitting phase of the project have been included in the Transportation Improvement Program and Air Quality Conformity Determination for FY 2004 to FY 2008.

Salem Station Improvements (Short-Term)

This Project would meet the MIS study goals of (2) Upgrading Existing North Shore Service through providing a more user-friendly service, improving intermodal connections, and adding parking supply; (3) Promoting North Shore Economic Growth through keeping the town center of Salem accessible, and (5) Encouraging Community Oriented Design by improving the station area design and integrating pedestrian and bicycle needs.

This Project has been categorized as a short-term priority. The proposed parking garage would meet 100% of the projected 2025 parking demand. The proposed garage may result in additional benefits to the community, such as parking for the Essex County Courthouse campus, depending on the design and financing plan for the project and support transit-oriented development. Funds for the design and permitting phase of the project have been included in the Transportation Improvement Program and Air Quality Conformity Determination for FY 2004 to FY 2008.

North Shore Bus System Improvements (Short- and Medium-Terms)

This Project would meet the MIS study goals of (4) Minimize Environmental Impacts through the improvement of Air Quality to be realized as a result of the new bus equipment. This Project has been categorized as a priority in both the short and medium terms. As noted many of the improvements considered for the North Shore bus system are currently underway. This is a planned major investment by the MBTA not only on the North Shore, but encompassing the entire bus fleet. Although implementation of some improvements is being planned in the short-term, some may take longer to implement. It is planned that by the end of 2004 Environmentally Clean Diesel buses will be operating on the North Shore. In addition all buses operating on the North Shore that were first put into service prior to 1995 will be retired by the end of 2004, thereby resulting in a fleet of buses that are all under 5 years old.

Newburyport Branch and Rockport Branch Increased Frequencies (Short-, Medium-, and Long-Terms)

This Project would meet the MIS study goals of (1) Improving Community Access and (2) Upgrading Existing North Shore Service through the addition of additional peak and off-peak train service. This Project has been categorized as a priority in the short, medium and long-term. Implementation of the Project is proposed to be developed in a phased approach to reconcile the growing needs of the communities in the North Shore and the limited resources of the MBTA. Service frequencies at some stations along the Newburyport/Rockport Line have the highest in the MBTA's system. Beverly is serviced by 32 inbound trains each weekday while service at other high-frequency stations are all lower (Route 128 – 30 trips, Canton Junction – 27 trips, and Anderson/Woburn 23 trips) and most stations on the system are served by under 20 trains each day. Full implementation of this project will depend on improvements made to other lines and the ability to balance service across the entire commuter rail system. The phased approach takes in to account existing gaps in service; availability of existing train sets; system capacity constraints; and financial constraints. The following would be included in each phase:

Short-Term: As noted there is little capacity to currently add trains during the peak period to North Station, and the focus of all the additional trains in this phase will be to increase off-peak service. However there does appear to be the potential to add some "shoulder period" trains. These are trains that arrive or depart North Station in the hour immediately before or after the peak period. The short-term phase of this project will focus on adding these shoulder period trains by expanding the service by two round trips each weekday. There also appears to be a need for additional evening trains along the line which may be possible to add during the short-term. The specific schedule and destination of the proposed trains will depend on trainset availability, crew scheduling and system capacity.

Medium-Term: During the medium-term phase, the focus will be to add trains to the mid-day period. An expanded schedule during this period would benefit existing riders, providing added flexibility to daily trips and encourage additional riders that want travel choices but do not or can not travel during peak periods. The projected service would add approximately six round trips each day and would result in hourly service to each of the terminal stations. Some modification to existing mid-day service schedules would be necessary. The medium-term improvements require the additional passing sidings along the Newburyport Branch and possibly would require additional trainsets depending on trainset availability and service needs on other lines.

Long-Term: During the long-term phase, the goal will be to implement the full service schedule, where additional trains would be added during the evening period and another peak-period train would be implemented. This would result in the line achieving at least hourly service each weekday between 5 AM and midnight. The long-term improvements would result in the need to procure additional commuter rail vehicles. In addition, the increased service frequencies may also require other commuter rail system infrastructure improvements in order to eliminate or minimize operational and capacity constraints along the line. These improvements may include the Salem Tunnel, Signal System Improvements and addressing possible capacity constraints at North Station in Boston. The impact that each of these constraints has on the operational capacity of the line varies and must be assessed individually and collectively to determine the most efficient and cost effective manner to minimize constraints on the line and thereby enable efficient operation of the full service schedule.

Rockport Station Improvements (Medium-Term)

This Project would meet the MIS study goals of (2) Upgrading Existing North Shore Service through providing a more user-friendly service and adding parking supply, (3) Promoting North Shore Economic Growth through promoting a tourist connection/destination, and (5) Encouraging Community Oriented Design by improving the station area design and integrating pedestrian and bicycle needs.

This Project has been categorized as a medium-term priority. MBTA funding precludes implementation of the Project in a shorter time-frame, while funds have been identified for the design of the proposed improvements, construction funds have not been identified.

Lynn to Boston Ferry Service (Medium-Term)

This Project would meet the MIS study goals of (1) Improving Community Access, (2) Upgrading Existing North Shore Service; and (3) Promoting North Shore Economic Growth. This Project has been categorized as a medium-term priority. Presently there appears to be only limited demand for ferry service from Lynn to Boston. The planned development of the South Boston waterfront may result in increased demand with a direct stop there. Additionally demand may be affected by the potential extension of Blue Line service to Lynn. The uncertainty of future demand coupled with the significant operating costs makes it an expensive service option for the MBTA to offer.

Revere Commuter Rail Station (Medium-Term)

This Project would meet the MIS study goals of (2) Upgrading Existing North Shore Service through the addition of a new transit stop, (3) Promoting North Shore Economic Growth, and (5) Encouraging Community Oriented Design by focusing on station design to promote livability in urban centers.

This Project has been categorized as a medium-term priority. Presently there does not appear to be significant demand for commuter rail service from the Revere Station area. However, this area has considerable development pressures and is currently the subject of transit-oriented development planning. The outcome of that planning effort and any realized development may change the demand for commuter rail service in the area. Therefore if development occurs in the area immediately adjacent to the station it is likely that the ridership demand and prioritization of this Project would change.

South Salem Commuter Rail Station (Medium-Term)

This Project would meet the MIS study goals of (1) Improving Community Access by providing additional service to students of Salem State College and (2) Upgrading Existing North Shore Service through adding a new transit stop. This Project has been categorized as a medium-term priority. The potential ridership for the station is constrained due to a number of factors including: no planned parking, no direct pedestrian connection to the neighborhoods on the west of the tracks, and a lengthy pedestrian connection to nearby Salem State College. Although currently ridership demand is questionable, there could be other benefits realized that may make the South Salem Station a priority in the future. These benefits would accrue to both the nearby Environmental Justice community and Salem State College students, employees and faculty which could both be positively impacted by improved mobility and an improved connection to the transit system. However local concerns regarding potential adverse affects need to be addressed by the City before the Project can be further advanced.

Winthrop to Boston Ferry Service (Medium-Term)

This Project would meet the MIS study goals of (1) Improving Community Access, (2) Upgrading Existing North Shore Service; and (3) Promoting North Shore Economic Growth. This Project has been categorized as a medium-term priority. Since the project is expected to result in operational self-sufficiency in the long-term, and the public investment will leverage additional private investment, it appears to be financially practical. The project is presently in the design phase for the improvements at the Winthrop Ferry Terminal with construction proposed for 2006 and an interim start-up/demonstration service in 2004/2005 if additional financial support is secured. This project is being sponsored and advanced by the Town of Winthrop. The uncertainty of future demand coupled with the significant operating costs makes it an expensive service option for the MBTA to offer.

Salem-Danvers via Peabody Commuter Rail Service (Medium-Term)

This Project would meet the MIS study goals of (1) Improving Community Access, and (2) Upgrading Existing North Shore Service by adding a new transit service to the area, (3) Promoting North Shore Economic Growth, and (5) Encouraging Community Oriented Design through possible coordination of development opportunities near the Peabody Square station. This Project has been categorized as a medium-term priority. Initial ridership projections indicate that this Project would result in approximately 3,000 commuters boarding the new commuter rail service each weekday. However, these projections assume unconstrained, discounted parking at each new station. One specific parking and access attributes are further defined, the project ridership may be affected.

This service would provide transportation benefits to communities throughout the North Shore area by increasing the overall capacity of the transit system thereby relieving pressure on existing services. Although it is recognized that the service could have significant benefits, additional efforts would need to be advanced prior to implementation, including a more detailed engineering feasibility study, permitting and design. In recognition of the work that would need to occur to advance the project and the financial resources necessary to implement the Project it is projected to occur during a medium-term time frame (10 to 20 years)

After analyzing the alternative alignments and terminal locations it is further recommended that the proposed option for the Project be the Danversport option that terminate near Endicott Street in Danvers. (See Figure 3-9, Option 2-D & 2-F). This route appears to result in the least potential impacts while minimizing costs and maintaining connectivity between the proposed service and Route 128. The North Shore Mall option, which runs parallel to Lowell Street is adjacent to Proctor Brook and appears to have significant wetland, noise, and traffic impacts to the neighborhoods along the route. The Danversport option alignments which extends north of Endicott Street would require additional bridges to cross over the Crane River and significant roadway work to provide access from Route 128. Although this is the recommended project definition, additional studies will need to be undertaken to confirm this preliminary assessment.

The Project could be implemented in a phased approach, initiating service first to Peabody Square and then to the terminal station. The segment of track between the existing Salem Station and the proposed Peabody Square station does not require improvements as substantial as the other proposed segments since it is currently being used by a freight rail operator. Traffic impacts could also be minimized by avoiding use of the grade crossings in Peabody Square. The first phase, providing service to Peabody would cost approximately $72 million, with half for infrastructure improvements and half for new rail equipment. This first phase would attract approximately half of the ridership projected for the full build which would have a Route 128 terminus.

Newburyport/Rockport Line Coaches (Medium- and Long-Terms)

This Project would meet the MIS study goals of (2) Upgrading Existing North Shore Service through the ability to increase the capacity of the existing transit service. This Project has been categorized as both a medium-term and long-term priority. The MBTA has been continually updating and improving the commuter rail fleet to keep up with the unprecedented growth in ridership and system expansion over the past decade. Demand on the Newburyport / Rockport Line will be accommodated over the next ten years by increasing the trainset size using primarily existing single-level coaches. After that time, the single-level coaches will be replaced by bi-level coaches as is necessary to accommodate further growth on the Newburyport/Rockport Line. By 2020 it is expected that all the existing single-level coaches will be replaced with new bi-level coaches. Procurement of additional trainsets or coaches to accommodate growth in existing services or the expansion of service would need to be assessed at the time that the added demand is realized.

Newburyport Branch and Rockport Branch Station Improvement Program (Long-Term)

This Project would meet the MIS study goals of (2) Upgrading Existing North Shore Service through providing a more user-friendly service. This Project has been categorized as a long-term priority. Although the accessibility of stations along the Newburyport/Rockport branches can be improved, most of the stations have some barrier-free way to access trains, principally through utilizing “mini-high” platforms. Improving accessibility at all stations is a goal of the MBTA, however there are over 35 stations on the MBTA system which are a higher priority since they are not accessible at all. The trip time savings realized from the proposed improvements would be minimal since the stations currently with low-level platforms accommodate fewer than 500 daily inbound boardings. Furthermore, the compatibility of the proposed improvements with the surrounding communities and operation of longer trainsets projected to be used in the future (requiring high-level platforms longer than those possible along the branches) makes the feasibility of the proposed improvements questionable. Therefore of the projects identified and considered, only the North Beverly station improvements are recommended. This is the only project that would be compliant with the MBTA standard calling for 800 foot-long station platforms. The reduced platform concepts developed for the other stations would result in only minimal improvements to access.

Newburyport Branch and Rockport Branch Highway Grade Crossing Improvements/Elimination Program (Long-Term)

This Project would meet the MIS study goals of (2) Upgrading Existing North Shore Service through the potential improvements to travel time along the Newburyport/Rockport Line. This Project has been categorized as a long-term priority. The MBTA has continually focused on efforts to improve safety across its entire commuter rail system. One way it has focused on safety has been to ensure that grade crossing protection and warning systems are appropriately maintained and modified to accommodate the level of traffic at the grade crossing. Currently the warning systems employed at the crossings along the Newburyport/Rockport Line are appropriate for the levels of train and automobile traffic. Although the grade separation of crossings is the ultimate in protection systems, the elimination of the crossing is a major expense and must be prioritized along with the other safety demands across the entire MBTA system.

Beverly to Boston DMU/Shuttle Service (Long-Term)

This Project would meet the MIS study goals of (1) Improving Community Access through the addition of more train service to Beverly and (2) Upgrading Existing North Shore Service through providing a more user-friendly service.

This Project has been categorized as a long-term priority. Other efforts to improve service along the line, such as the Newburyport Branch and Rockport Branch Increased Frequencies Project, would result in similar benefits to the corridor between Beverly and Boston with additional benefits to other North Shore communities, and without the capital expenditures required for new DMUs. Furthermore, implementation of the proposed Project would improve service along a commuter rail corridor that already has one of the most frequent commuter rail services on the MBTA's system with 32 inbound trains departing Beverly Depot each weekday. Additional service along this corridor must be considered in context with the service offered on the remainder of the MBTA's commuter rail system. In addition, the projected operating savings of DMUs would likely not offset their high initial cost, thereby making use of existing equipment more cost effective (includes the construction of maintenance facility).

Newburyport Branch and Rockport Branch Signal System Upgrades (Long-Term)

This Project would meet the MIS study goals of (2) Upgrading Existing North Shore Service through the ability to increase commuter rail capacity. This Project has been categorized as a long-term priority. The benefits of such a system would certainly help operations along the Newburyport/Rockport lines. However, installation of a cab signal system would most efficiently be conducted on the entire North Side (lines operating out of North Station) system at one time. The capital cost estimate developed only reflects improvements to the Eastern Route Main Line between North Station and Newburyport/Rockport. The installation of cab signaling on the entire North Side would be a major investment that would need substantial analysis to identify the specific costs and benefits prior to being recommended or implemented. The ability for the project to realize any improvements to capacity along the Newburyport/Rockport Line needs to be assessed in conjunction with other capacity constraints along the line. North Station capacity improvements would need to be made before any substantial peak-period improvements could be made.

However, in the medium term it is projected that other signal improvement projects will be conducted to improve the reliability of the Rockport branch signal system through a series of tasks: replacement of the track code system, installation of a power switch, elimination of the pole line, and upgrading the crossing warning systems. Additionally signal upgrades are projected to occur between Beverly Junction and Chelsea on the Eastern Route Main Line.

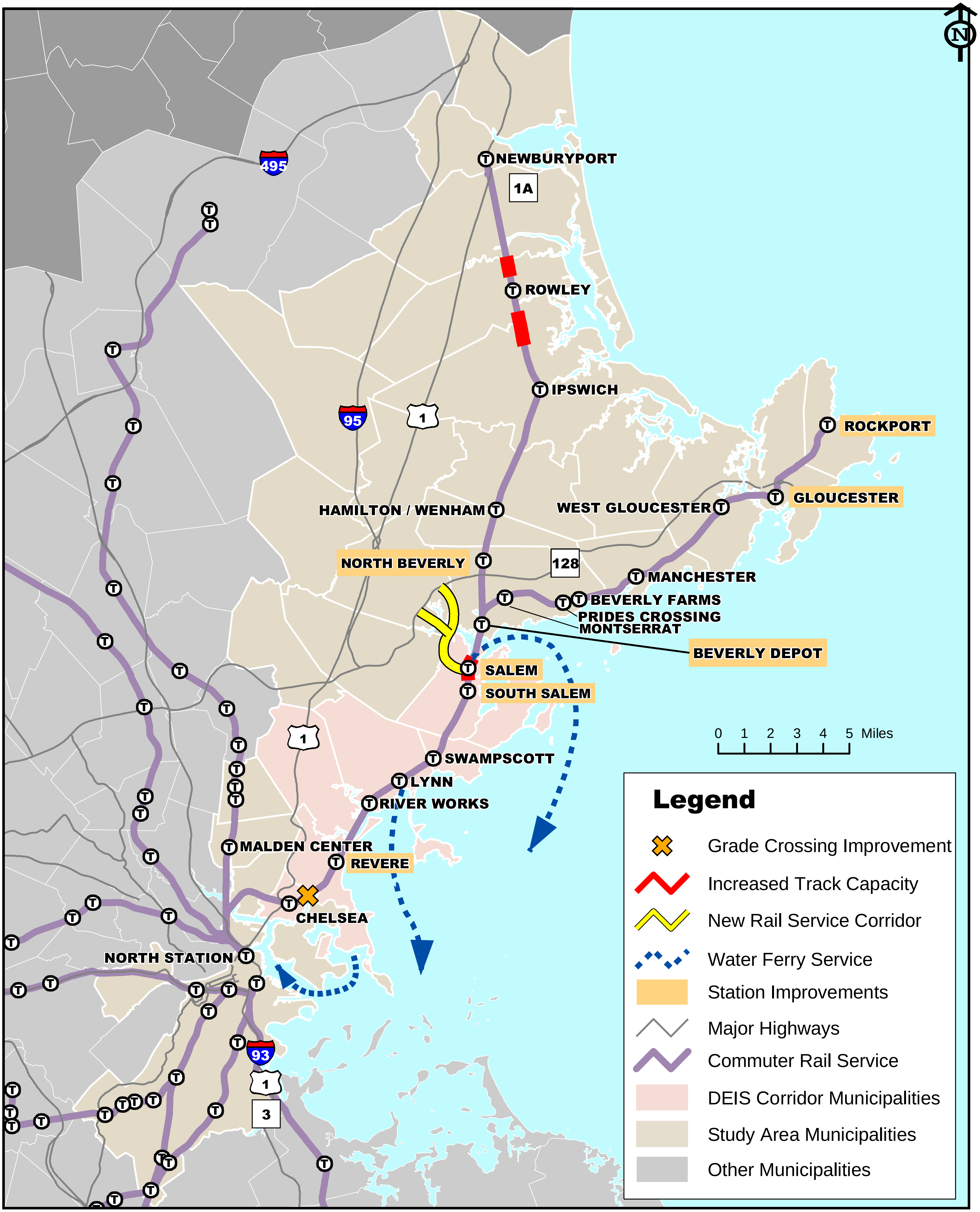
Second Salem Tunnel (Long-Term)

This Project would meet the MIS study goals of (2) Upgrading Existing North Shore Service through the ability to increase commuter rail frequency and capacity. This Project has been categorized as a priority in the long-term. The addition of a second tunnel through Salem as a stand alone project would not eliminate all major capacity constraints along the line. The capacity of the platform track and approaches at North Station in Boston, shared with other MBTA North Side commuter rail services, is presently constrained and any major increases in peak period frequencies would first need to address the issues at North Station before implementing any improvements to the Salem Tunnel.

The addition of the second tunnel would only be able to accommodate minor enhancements to service scheduling if it was not done in conjunction with other system-wide operational improvements on the commuter rail system operating out of North Station, such as additional layover facilities, additional coaches and locomotives and maintenance facility capacity. All of these issues need to be addressed, along with the capacity of North Station prior to further consideration of the construction of a Second Salem Tunnel.

Salem to Boston Ferry Service (Long-Term)

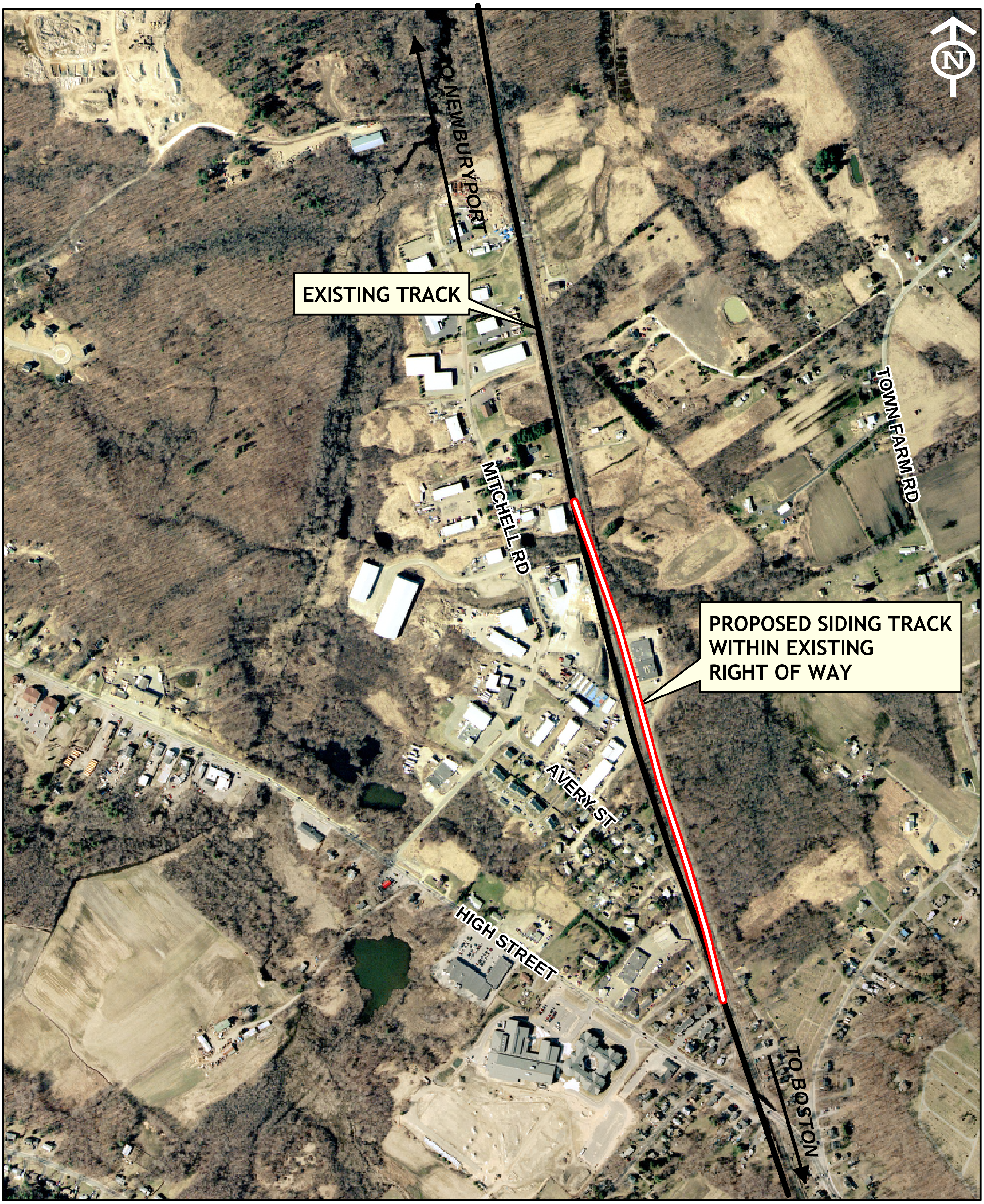
This Project would meet the MIS study goals of (2) Upgrading Existing North Shore Service; and (3) Promoting North Shore Economic Growth. This Project has been categorized as a long-term priority. Benefits to economic development efforts of the City of Salem would be realized through implementation of this Project by having a direct water connection to the City of Boston. Since much of Salem’s historic identity is tied to its former stature as a vibrant seaport, the ability to access the City via water is important for its visitor economy. The City is undertaking an aggressive Harbor Plan to revitalize its waterfront and the ferry service is an important component. The project may be able to capitalize on the efforts of the Harbor Plan by utilizing the proposed New Salem Wharf, thereby minimizing landside capital costs and requirements. However the success of this project will require a deliberate and focused marketing effort to draw and maintain the tourist-based ridership and to overcome the seasonality of the service. Although travel time savings would not be achieved by most existing transit users as a result of the service, the demonstration project established that there may still be a commuter base that would prefer the ferry service. Travel time savings could begin to accrue in the long-term with the build out of the South Boston waterfront area and a direct ferry service connection there.



MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 3-1
Project Locations

Parsons Brinckerhoff
DMJM HARRIS



MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

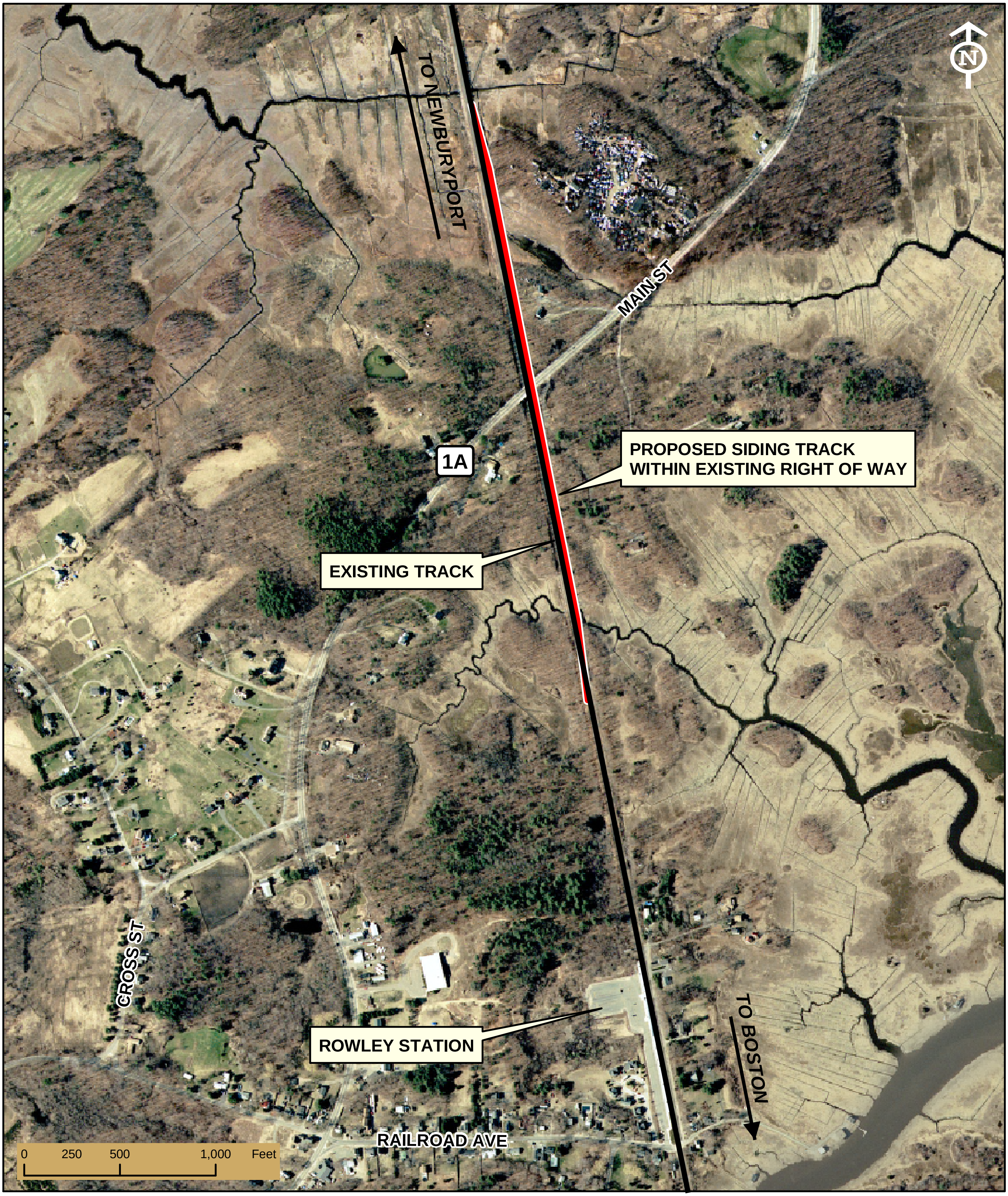
Figure 3-2

NEWBURYPORT LINE
IPSWICH SIDING

Parsons Brinckerhoff

100 YEARS

DMJM HARRIS



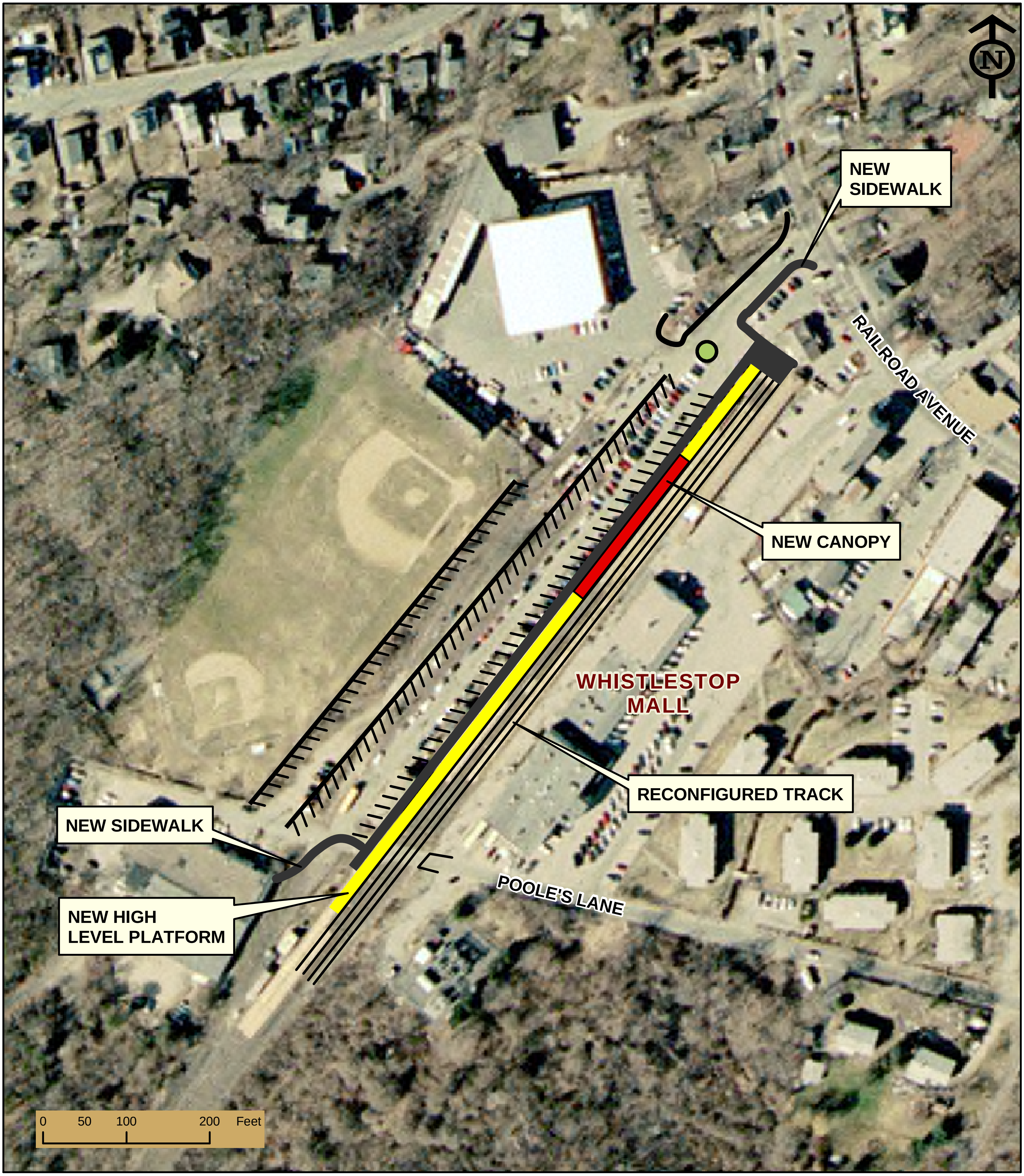
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 3-3

NEWBURYPORT LINE
ROWLEY SIDING

Parsons Brinckerhoff

DMJM HARRIS



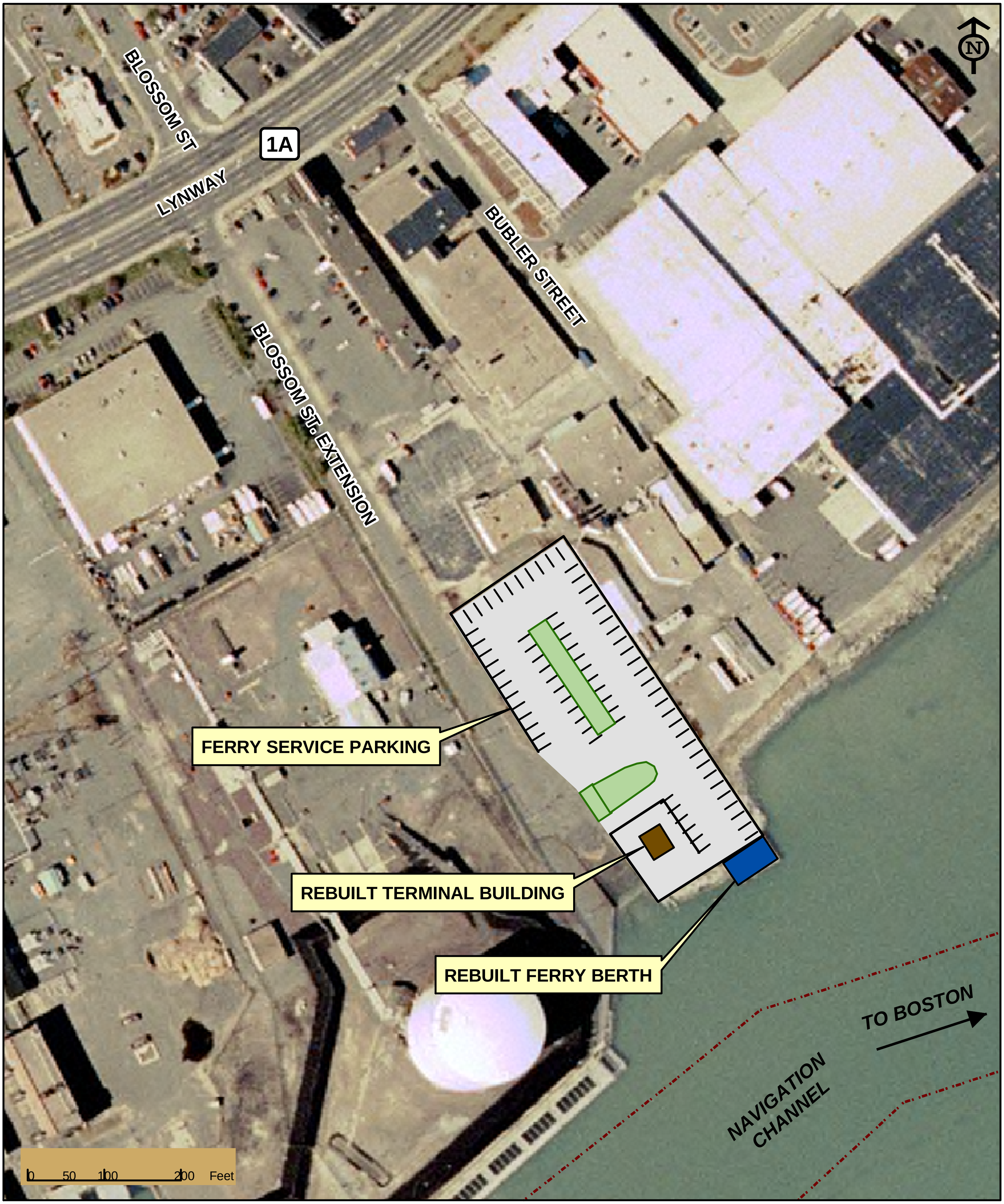
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 3-4

ROCKPORT STATION

Parsons Brinckerhoff

DMJM HARRIS

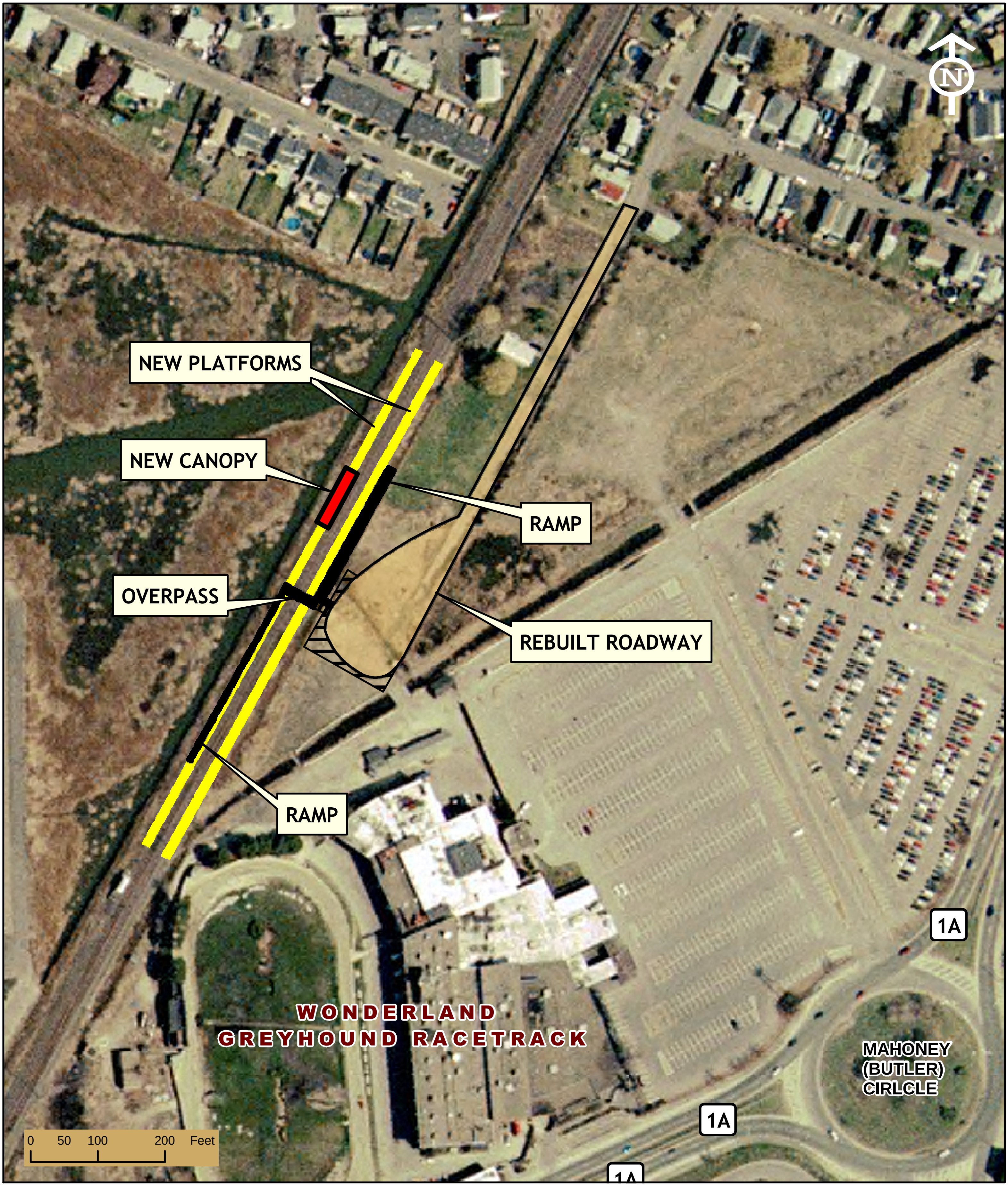


MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 3-5
LYNN FERRY TERMINAL

Parsons Brinckerhoff

DMJM HARRIS



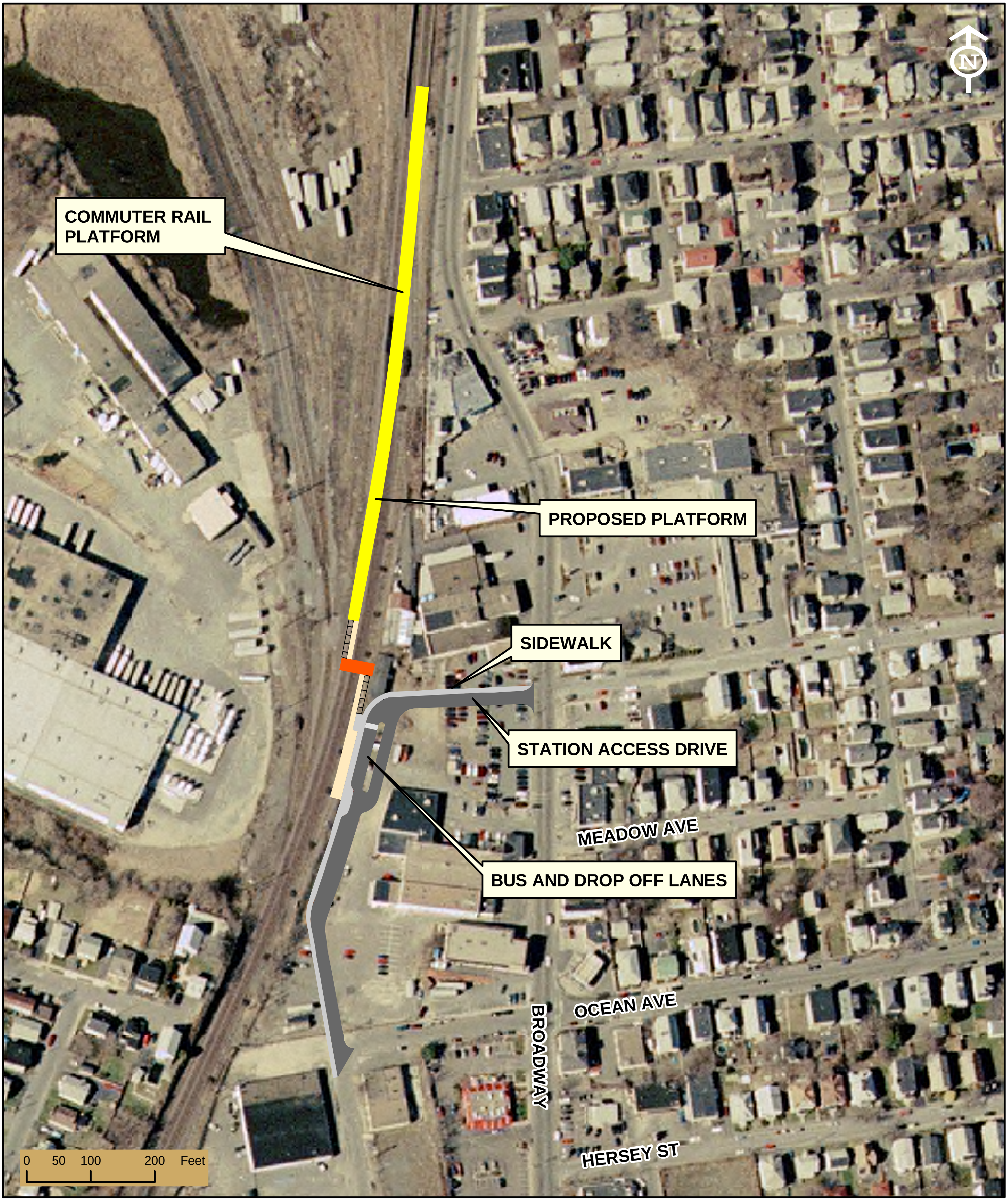
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 3-6

REVERE STATION

Parsons Brinckerhoff

DMJM HARRIS

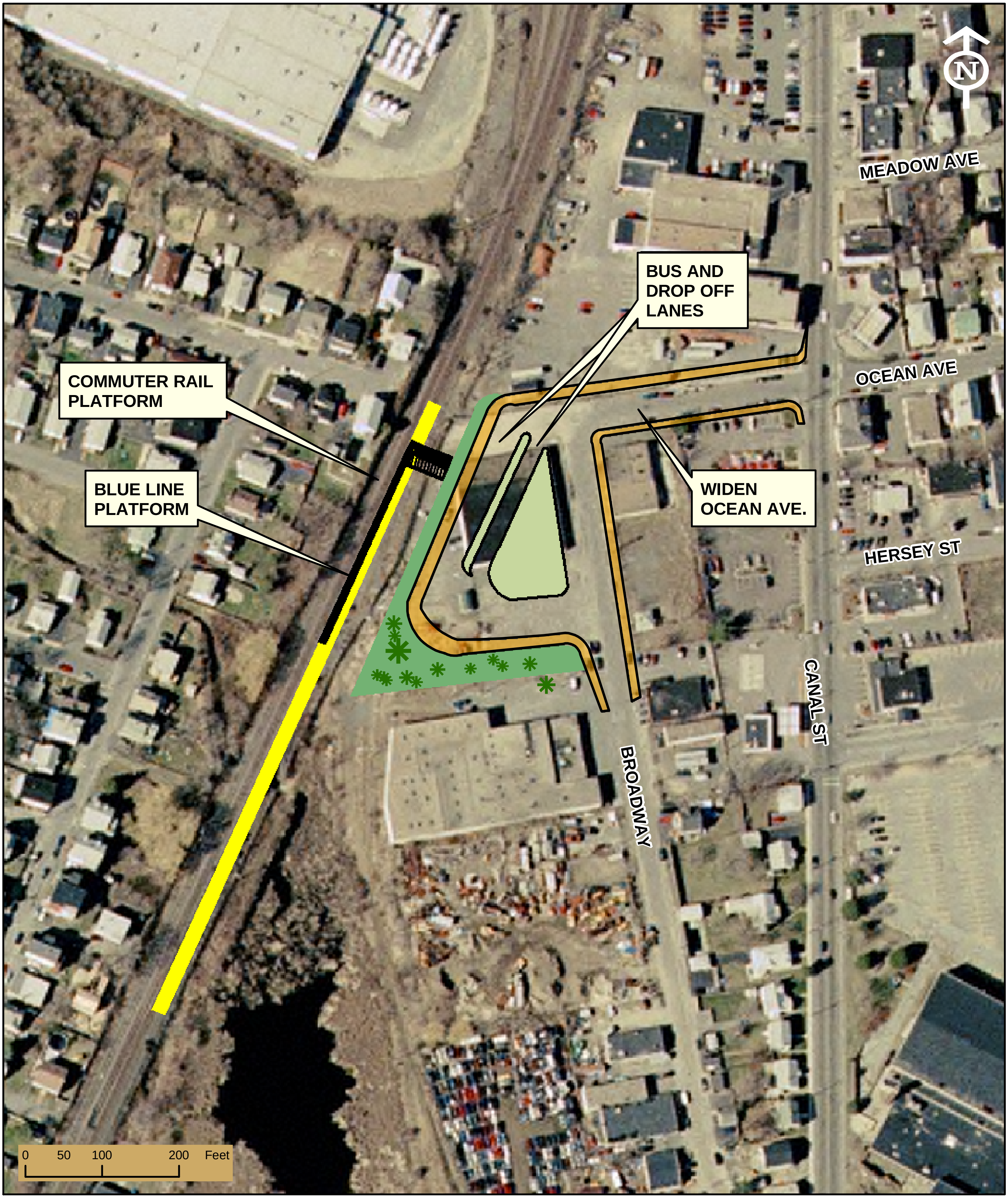


MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 3-7
SOUTH SALEM STATION
(NORTH OPTION)

Parsons Brinckerhoff
100 YEARS

DMJM HARRIS

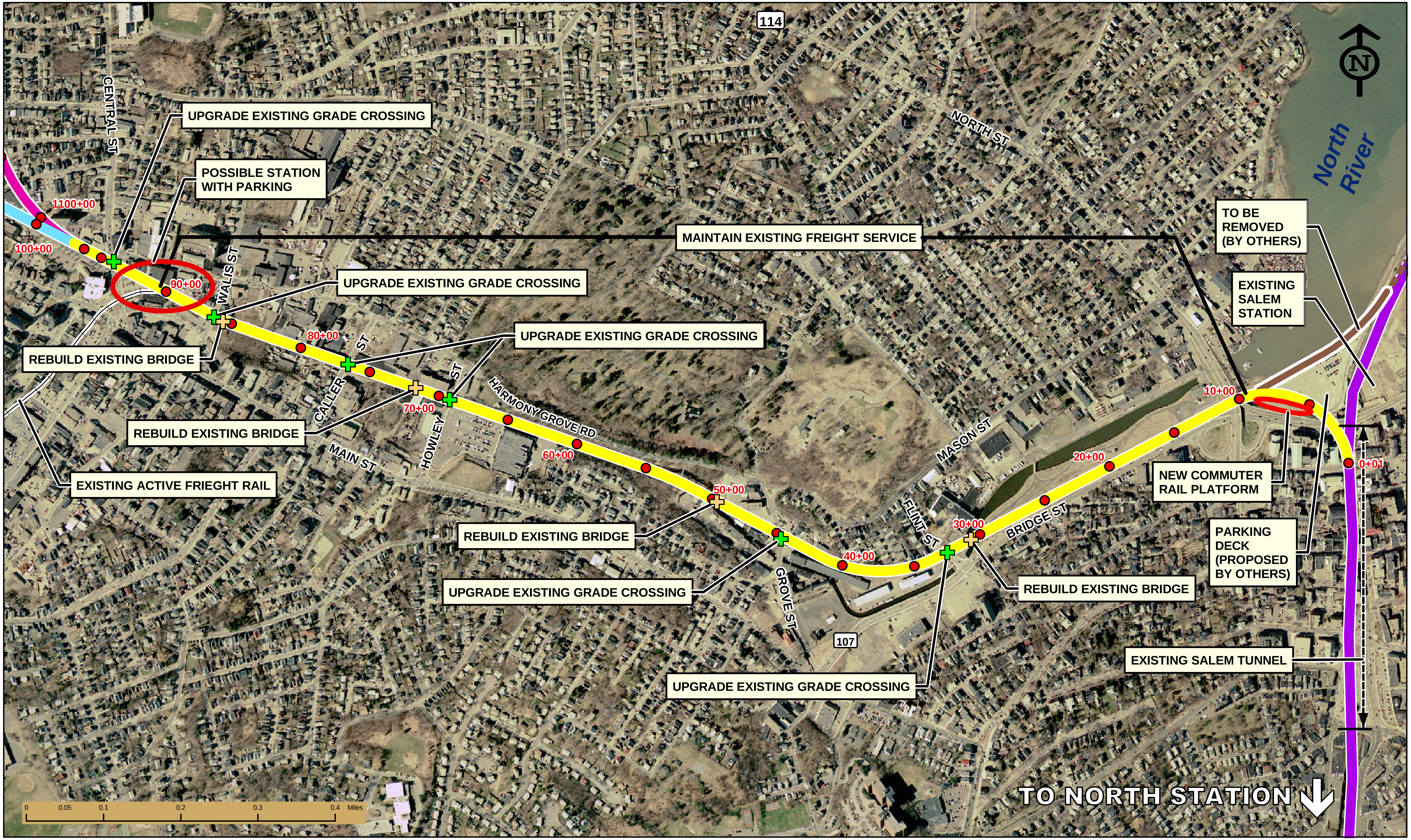


MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 3-8
SOUTH SALEM STATION
(SOUTH OPTION)

Parsons Brinckerhoff

DMJM HARRIS



MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

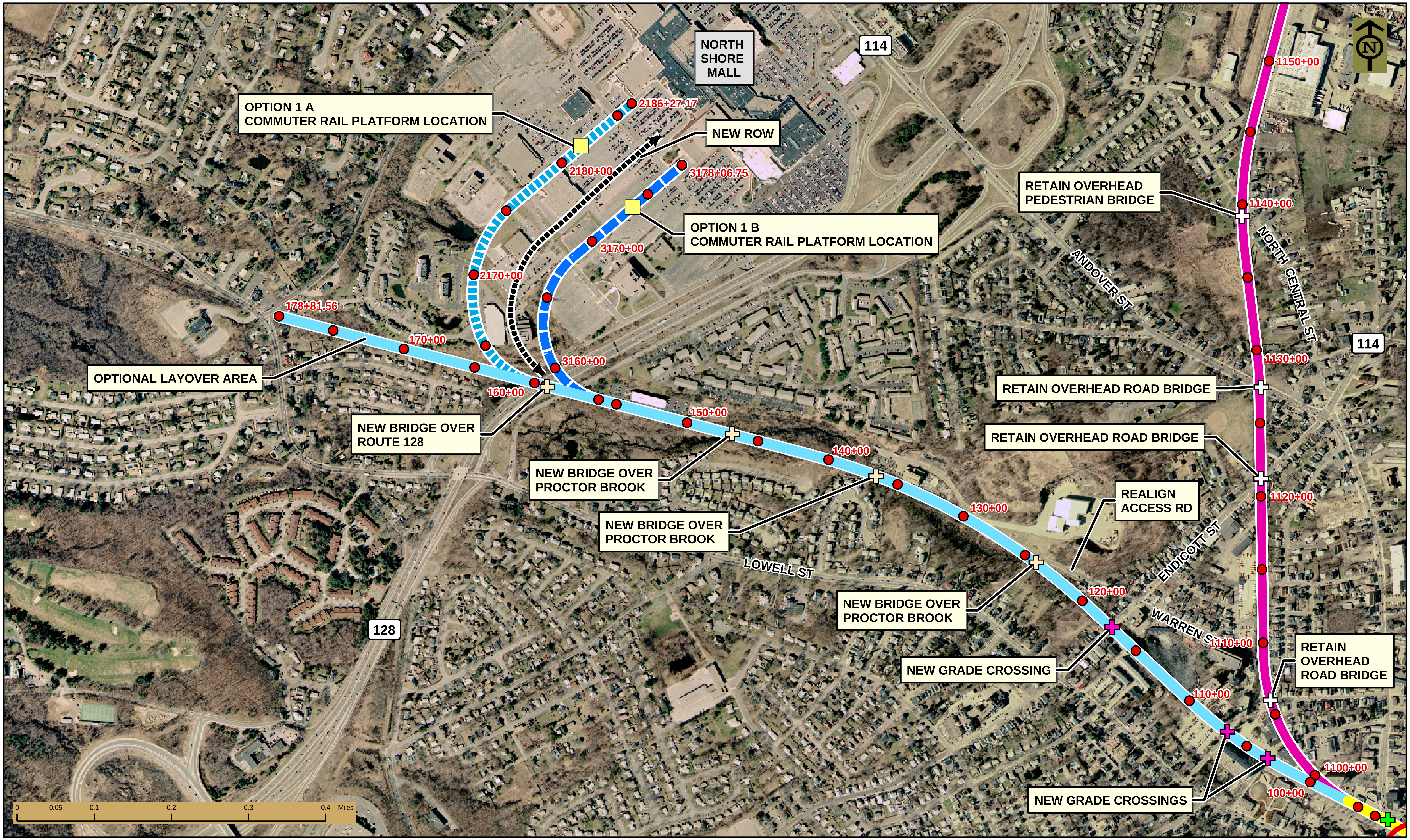
SALEM - DANVERS VIA
PEABODY COMMUTER RAIL SERVICE

FIGURE 3-9

SHEET 1

Parsons Brinckerhoff

DMJM HARRIS



MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

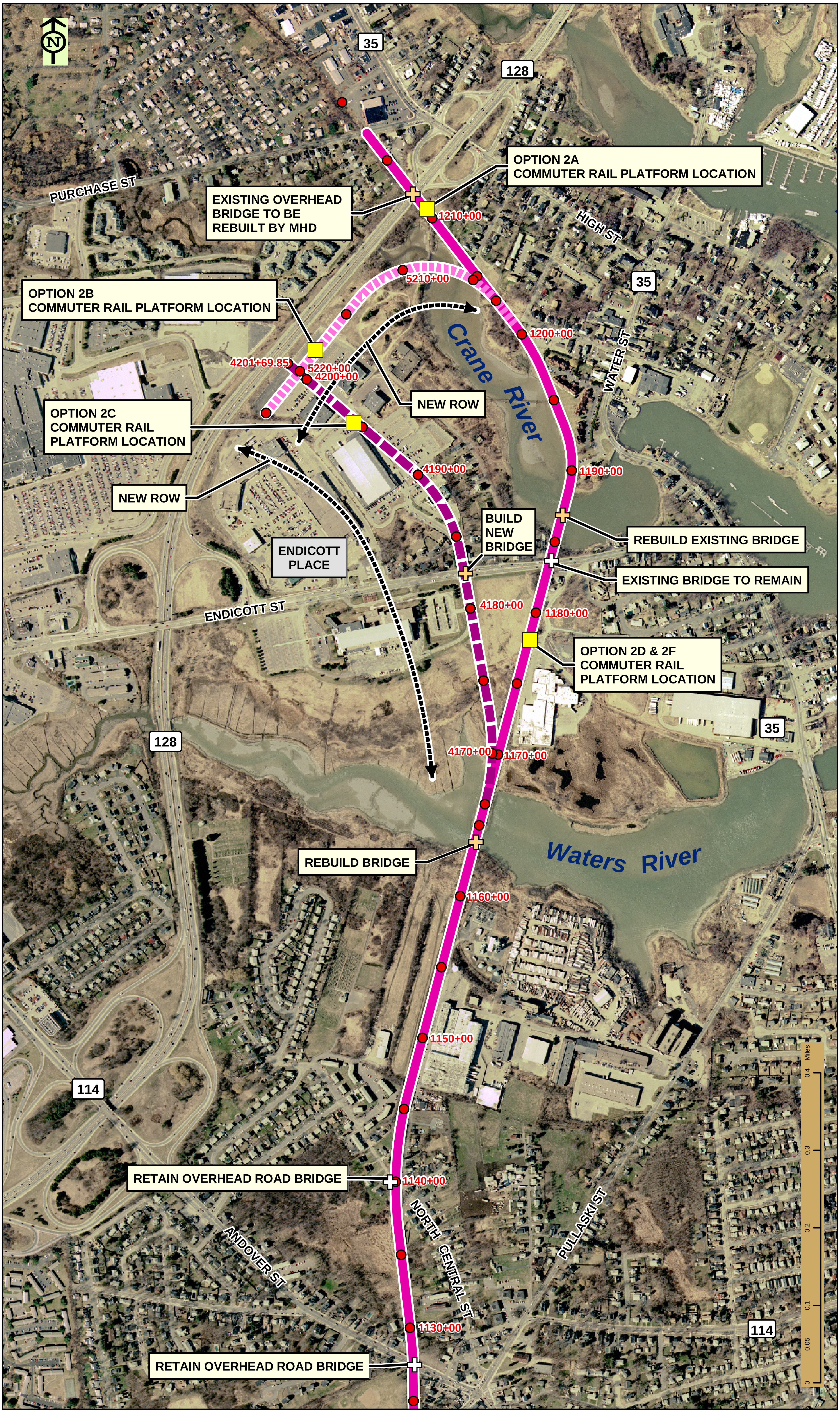
SALEM - DANVERS VIA
PEABODY COMMUTER RAIL SERVICE

FIGURE 3-9

SHEET 2

Parsons Brinckerhoff

DMJM HARRIS



DMJM HARRIS

Parsons Brinckerhoff

SHEET 3

SALEM - DANVERS VIA
PEABODY COMMUTER RAIL SERVICE

MASSACHUSETTS
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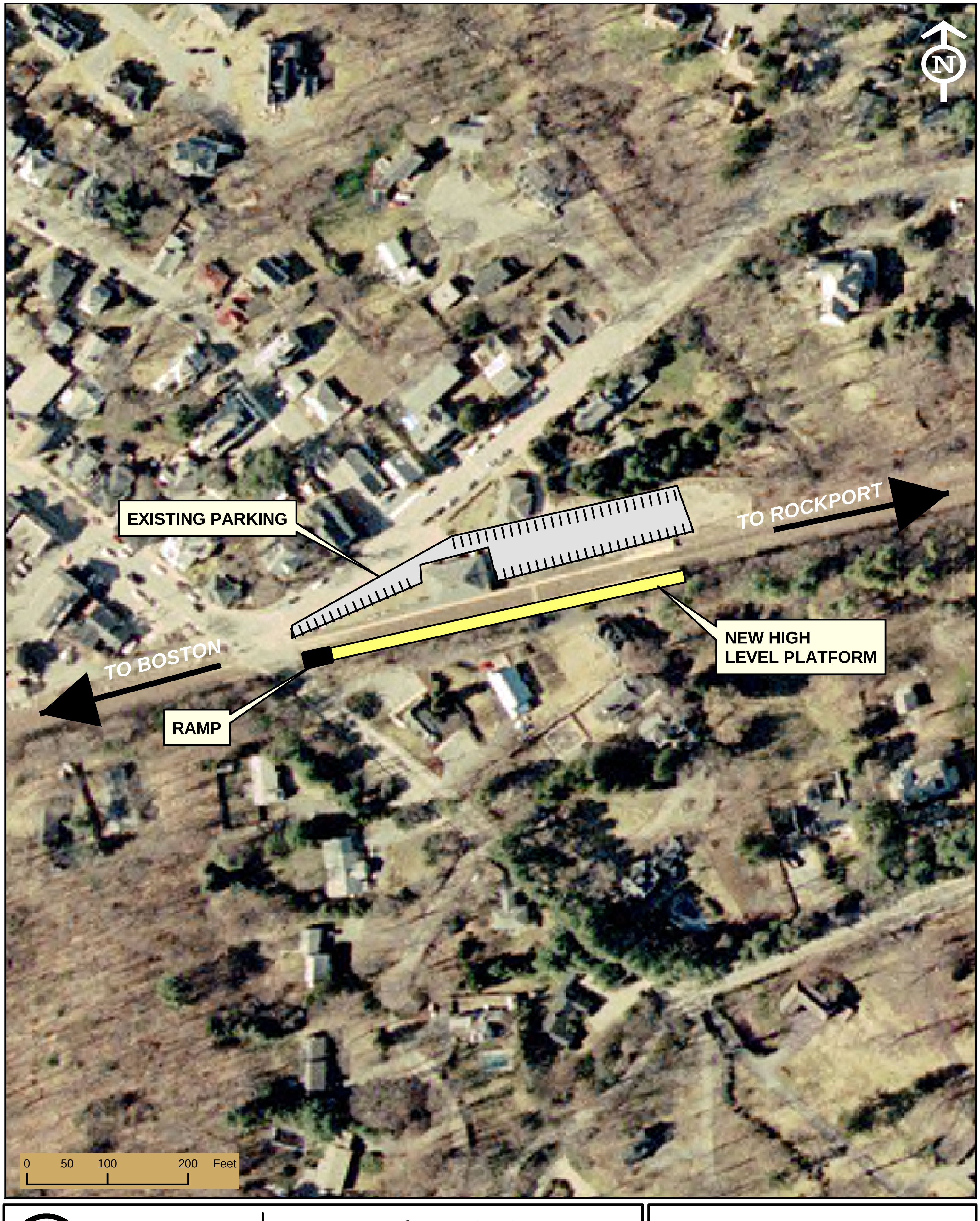
TRANSPORTATION
AUTHORITY



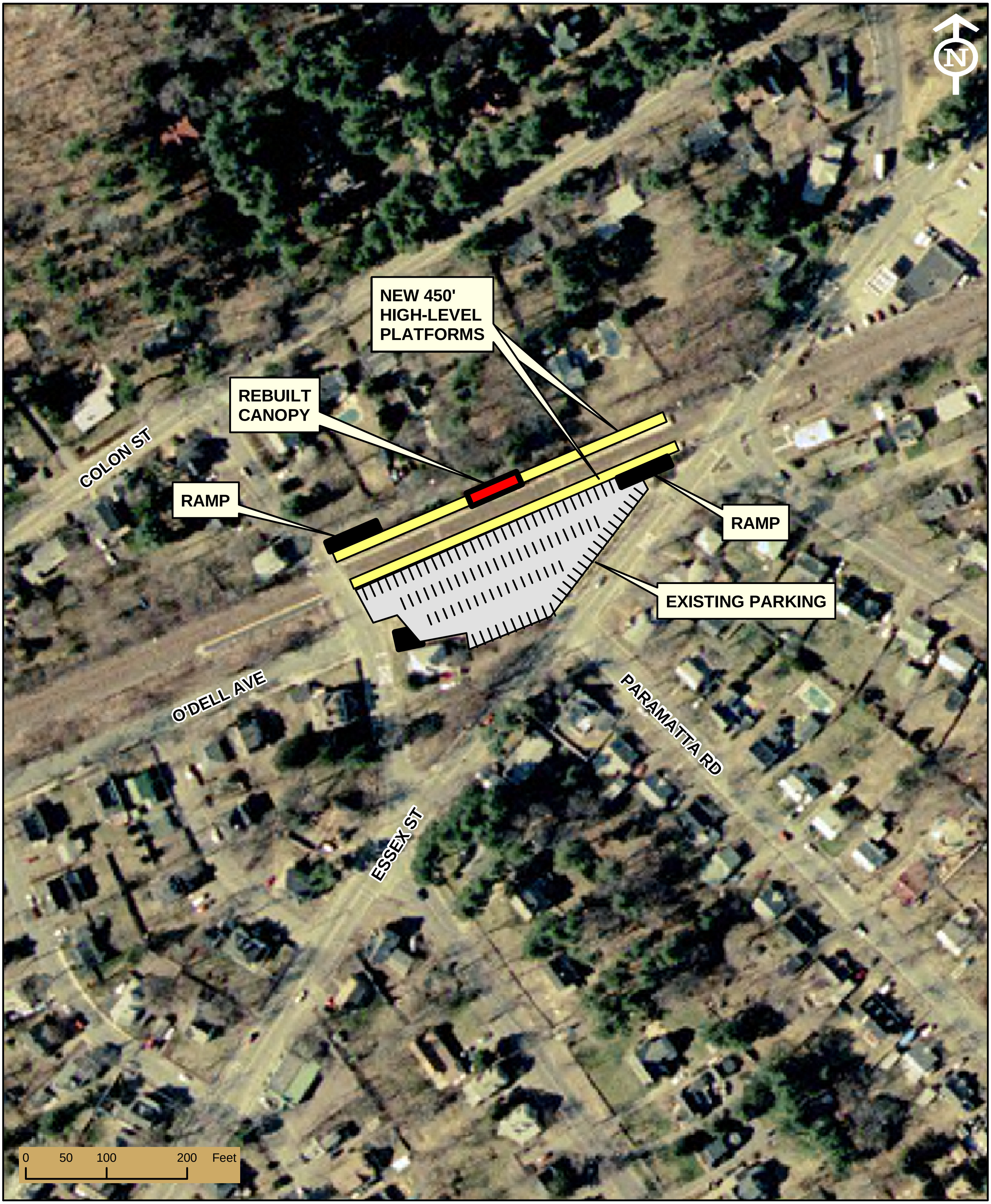
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 3-10
BEVERLY FARMS STATION

Parsons Brinckerhoff
100 YEARS

DMJM HARRIS

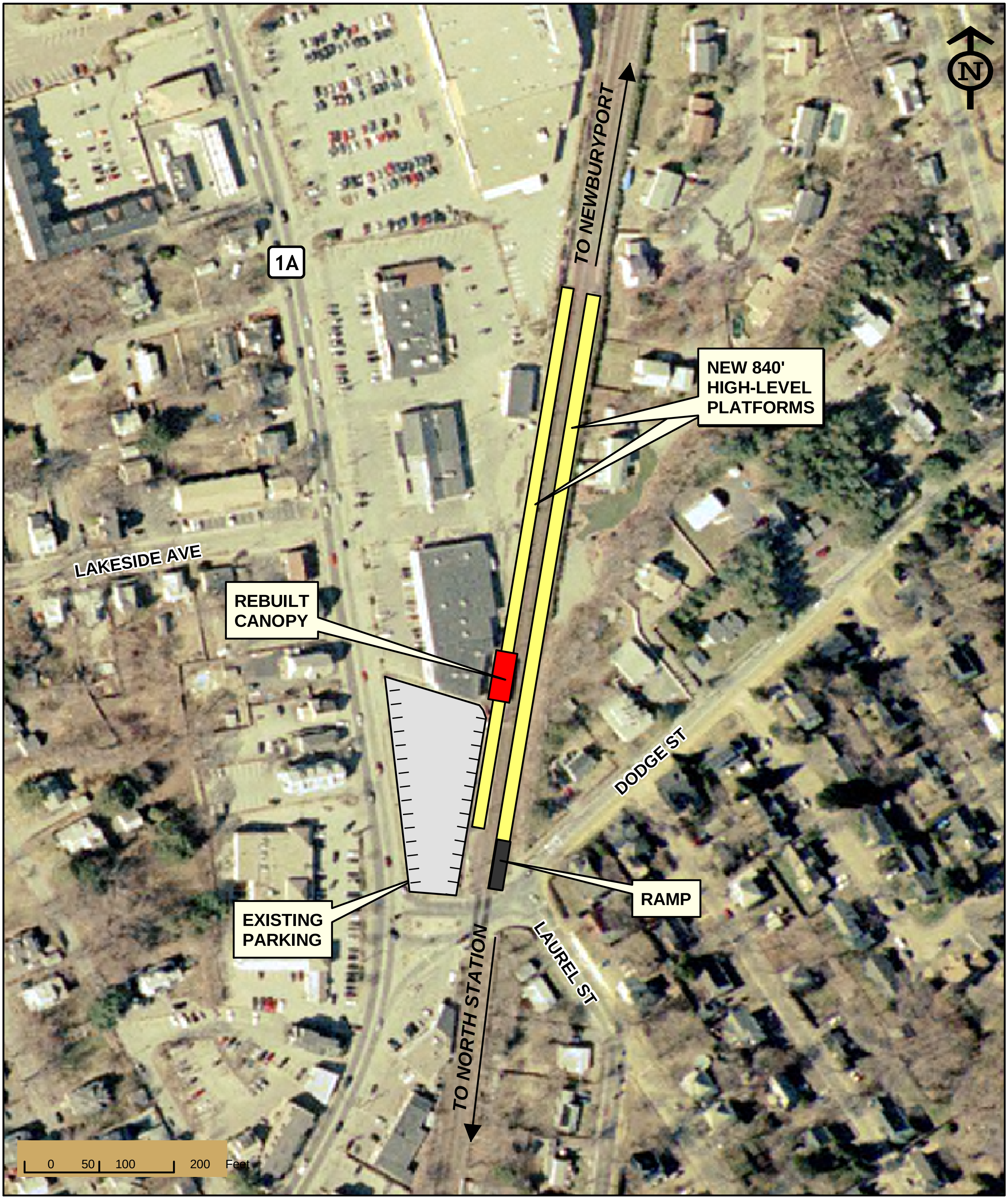
I:\projects\north-shore-MIS\beverlyfarmsstation.mxd



MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

Figure 3-11
MONTSERRAT
STATION

Parsons Brinckerhoff
100 YEARS
DMJM HARRIS



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AUTHORITY

Figure 3-12

NORTH BEVERLY STATION

Parsons Brinckerhoff

DMJM HARRIS

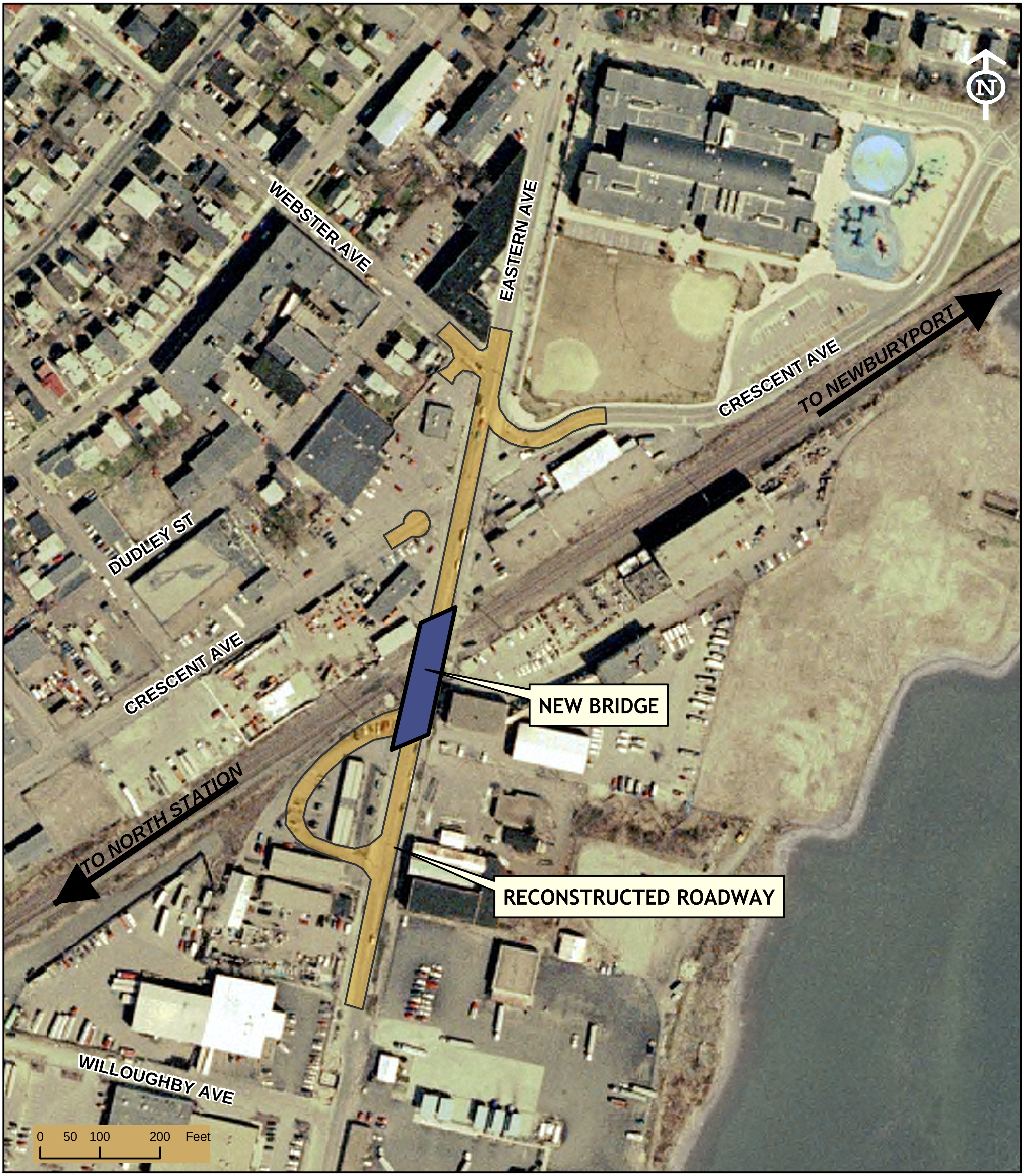

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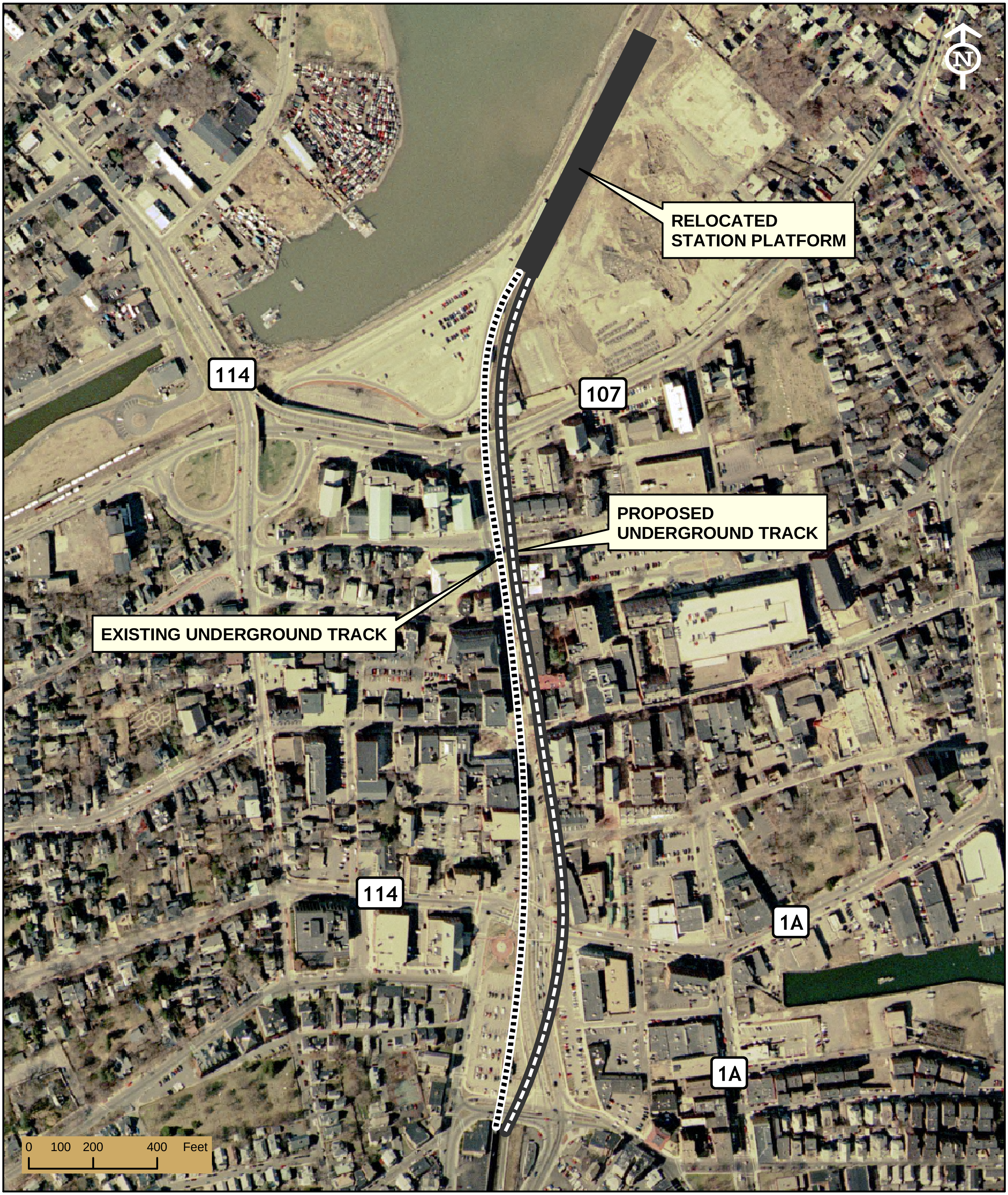
Figure 3-13
EASTERN AVE. GRADE CROSSING - CHELSEA

Parsons Brinckerhoff

DMJM HARRIS


RELOCATED STATION PLATFORM
PROPOSED UNDERGROUND TRACK
EXISTING UNDERGROUND TRACK
114
107
114
1A
1A
N
0 100 200 400 Feet

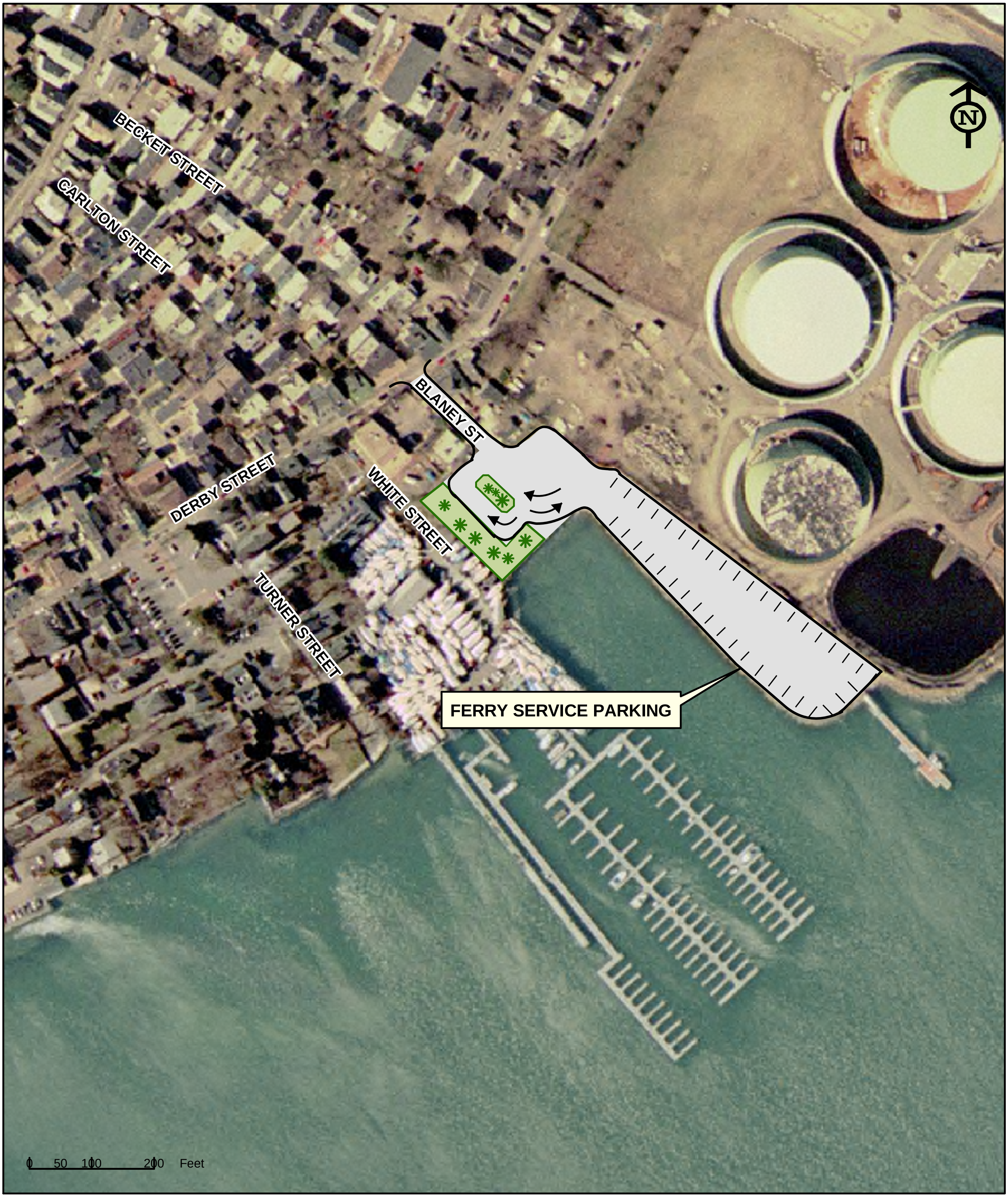
MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

Figure 3-14

SALEM
TUNNEL

Parsons Brinckerhoff
100 YEARS

DMJM HARRIS



MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Figure 3-15

SALEM FERRY TERMINAL

Parsons Brinckerhoff

DMJM HARRIS

Appendix A

Ridership Model Results

Appendix A. North Shore Transit Improvements MIS Ridership Model Results

Total Daily trips (inbound and outbound)

Total Daily trips (inbound and outbound)	S1 No Build	S2 New Revere Station	S3 New South Salem Station	S4 Enhanced CRR Service	S5 Salem to N. Shore Mall CRR Ext.	S6 Salem to Danversport CRR Ext.
New transit trips (diverted from auto)	N/A	200	400	2,400	2,600	2,200
Transit Mode Share (Daily)	7.34	7.34	7.34	7.35	7.35	7.35
Peak hour mode share (from N.Shore study area to downtown Boston and Cambridge, all trips)	39.00%	39.00%	39.00%	39.00%	39.00%	39.00%
Ridership Impacts						
Rockport/Ipswich Line ridership	32,700	33,100	33,500	38,200	38,700	38,500
Difference between Build & Base	N/A	400	800	5,700	6,000	5,800
Blue Line Ridership	88,700	89,300	89,000	92,300	92,400	91,900
Difference between Build & Base	N/A	600	300	3,600	3,700	3,200
Local and Express bus Ridership	34,300	34,200	34,200	34,900	35,000	34,800
Difference between Build & Base	N/A	-100	-100	600	700	500
Other transit modes (Orange Line, Haverhill Line, Private buses etc)	41,500	41,500	41,500	40,700	40,600	40,900
Difference between Build & Base	N/A	0	0	-800	-900	-600
Corridor Ridership	197,200	198,100	198,000	206,100	206,700	205,900
Impact on Corridor Ridership	N/A	900	800	8,900	9,500	8,700
Daily Fare revenue	881,775	882,500	882,200	907,850	898,700	895,950
Transfers (two-way)						
Transfers between Revere & Wonderland	N/A	500	N/A	N/A	N/A	N/A
Impact on Air Quality						
Regional CO (Kg) winter	1,124,500	1,124,500	1,124,400	1,124,000	1,123,900	1,123,900
Difference between Build & Base	N/A	0	-100	-500	-600	-600
Regional NOx (Kg) summer	208,300	208,300	208,300	208,200	208,200	208,200
Difference between Build & Base	N/A	0	0	-100	-100	-100
Regional VOC (Kg) summer	104,700	104,700	104,700	104,600	104,600	104,600
Difference between Build & Base	N/A	0	0	-100	-100	-100
Regional VMT	148,786,300	148,783,100	148,777,500	148,714,300	148,703,100	148,711,500
Difference between Build & Base	N/A	-3,200	-8,800	-72,000	-83,200	-74,800
Regional VHT	5,181,600	5,181,300	5,180,900	5,178,800	5,177,100	5,178,500
Difference between Build & Base	N/A	-300	-700	-2,800	-4,500	-3,100
Time Benefits						
User Benefits from SUMMIT (w.r.t. No Build)	N/A	N/A	N/A	N/A	N/A	N/A
Transit Time Savings (w.r.t. No Build in hours)	N/A	-60	-72	-608	-755	-685
- negative numbers show savings						